THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN

Vol. 9, No. 6 November-December, 1959

THE GARDEN JOURNAL OF THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

November 18, 1959, 2:30 P.M. Illustrated lecture on "Man's Search for Paradise in Gardens" by Dr. Clement Gray Bowers, at French Institute, 22 East 60th Street, New York City. Open to the public without charge, by The Garden Club of America.

December 17, 1959. Christmas Show opens in the Conservatory of The New York Botanical Garden. Note change from previously announced opening date.

Downtown Lecture Series 1959, sponsored by the Volunteer Associates of The New York Botanical Garden: January 7, Dr. William C. Steere—"The Geographical Distribution of Plants, Why They Grow Where They Do;" January 14, Dr. George C. Slate — "Garden Lilies;" January 21, A. Hyatt Mayor—"Renaissance and Baroque Gardens;" and January 28, Dr. Harold Gray—"Color for the Home."
Information may be obtained from the office of the Volunteer Associates of The New York Botanical Garden at 22 East 60th Street, New York 22, N. Y.

An Appropriate Christmas Gift

We suggest that an appropriate gift for relative or friend, interested in gardening or botany, is a membership in The New York Botanical Garden. No other gift will give so much pleasure at Christmas and throughout the year.

The privileges of membership and the various classes are described on page 228 of this issue.

CONTENTS

November-December, 1959

The Bicentenary of the Royal Botanic Gardens, Kew, 1759-1959 *William Campbell Steere* 189

The Royal Botanic Gardens, Kew, 1759-1959 *J. Robert Sealy* 191

Horticultural Impressions Abroad *Frederic Heutte* 201

U. S. Plant Introduction Station at Coconut Grove, Florida *Jeffrey E. Shrum, Jr.* 203

David Fairchild's Friends *William J. Robbins* 204

On Dexter Hybrids 205

Why Shade Trees Die Along City Streets *P. P. Pirone* 207

A Country Housewife's Garden *Gertrude B. Foster* 211

Ferns from Spores *as told by Anne Seaman to Dorothy Ebel Hansell* 212

A Grove in Beersheba *Philip Gillon* 216

What Is Conservation? 218

A Study of the Quince and its Fruits *Arnold Lowenstein* 218

Book Reviews 219

News, Notes and Comments 221

CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Mrs. Richard S. Meredith, Mrs. Donald B. Straus for the selection of the front cover illustration—**Cedrus atlantica glauca** in the Montgomery Conifer Collection at The New York Botanical Garden, photo by E. N. Mitchell; p. 189, Twickenham Times, Surrey; pp. 191-196, 199, the Studio, Royal Botanic Gardens, Kew; p. 203, upper right, William Whitman, Miami Beach, lower right, Steinmetz, Sarasota — courtesy Edwin A. Menninger, Stuart, Fla., as also p. 204; p. 205, the Library of The New York Botanical Garden; page 207, Douglas Eastman, others and p. 210, P. P. Pirone; pp. 212-215, E. N. Mitchell; pp. 216, 217, Israel Office of Information, New York; p. 221, E. N. Mitchell; pp. 222, 223 John J. Wurdack and Lincoln Adderley. P. 201, **Fuchsia magellanica**, p. 202, **Valeriana officinalis** and **Phyllitis scolopendrium** by Charles C. Clare, Jr., botanical artist at The New York Botanical Garden.

The Garden Journal of The New York Botanical Garden is published bimonthly by The New York Botanical Garden, Bronx Park, New York 58, N. Y. Printed in the U. S. A. Re-entered as Second Class Matter, February 1, 1951, at the Post Office at New York, N. Y., under the Act of August 24, 1912. Annual subscription, $2.00. Single copies 35 cents. Foreign countries and anywhere outside the continental United States, 50 cents a year extra.

THE BICENTENARY OF THE ROYAL BOTANIC GARDENS, KEW, 1759-1959

By **William Campbell Steere**

Dr. Steere is Director of The New York Botanical Garden.

THE IDEA OF establishing a major botanical garden in the United States arose in the mind of Professor Nathaniel Lord Britton, the leading botanist of his time, when, with Mrs. Britton, he visited Kew during the summer of 1888. After their return to New York, the Brittons' glowing accounts of the Royal Botanic Gardens impressed the Torrey Botanical Club so favorably that a committee was appointed immediately to consider the possibility of establishing a similar institution in this country. Dr. Britton's vision became a reality with remarkable rapidity. Less than three years later, on March 6, 1891, the Legislature of the State of New York passed a special act of incorporation for the institution and authorized the Commissioner of Parks to set aside two hundred and fifty acres of Bronx Park for it. Finally, with the necessary funds in hand by 1896, thanks to the energetic and enthusiastic support of many public-spirited citizens of New York City, exact plans could be drawn up and construction started. To make a long story short, the Conservatory Range and the Museum and Administration Building were opened to the public in 1900, and they have given ever-increasing public service for sixty years.

For reasons of terrain, climate and national attitudes (not to mention national pride!) The New York Botanical Garden was created in something other than the exact image of Kew—even in its name. Nevertheless, the long experience of Kew was extremely and obviously helpful to Dr. Britton in drawing up plans for his new institution and in developing its policies and aims. The historic relationship and the influence of Kew on the development of The New York Botanical Garden, that we acknowledge so gratefully today, is also well recognized at Kew. In his letter of April 8, 1959, C. E. Hubbard, Deputy Director of Kew, illustrates very clearly his understanding of this mutual relationship, as follows:

"You have doubtless heard that Her Majesty, The Queen will be visiting the Royal Botanic Gardens, Kew, on June 2nd of this year on the occasion of our Bicentenary. In connection with this visit, the scientific staff is setting up a series of exhibits illustrative of the past and present work of Kew, and the relationship of Kew to the progress of botany in various parts of the world. One of the exhibits has the general title 'The influence of Kew on North American Botany.'

"In reading Dr. Britton's letters, which are preserved at Kew, we are impressed by the long-continued and friendly personal interest between our two institutions. While we benefitted immeasurably from an exchange of books and specimens, we are inclined to feel that Kew's advice and help carried some weight in Dr. Britton's thinking.

"In the Kew correspondence there is a letter from Dr. Britton, dated from Columbia College Herbarium, December 13, 1890, addressed to Dr. Thiselton-Dyer. In this letter Dr. Britton says: 'We are agitating again the establishment of a great Botanic Garden in New York.'

"A second letter dated January 19, 1891, acknowledged receipt of a letter and documents. Unfortunately, we do not appear to have a copy of Dr. Thiselton-Dyer's reply. Since it is the cooperative aspect of the Kew-North American relationship that we wish to emphasize in the exhibition, we would be most grateful if you could supply us with a photographic copy of Dr. Thiselton-Dyer's letter. In addition, we would very much like to have (also for the exhibition) and 8 in. by 10 in. photograph of the front view of the Administration Building, and a similar sized photograph of T. H. Everett (another link with Kew)."

To anticipate our story a bit, it should be related here that Henry de la Montagne actually performed the remarkable feat, requiring skillful de-

Her Majesty The Queen and His Royal Highness The Prince Philip examine some insectivorous plants in the Orangery with Dr. George Taylor, Director of the Royal Botanic Gardens, Kew.

tective work, of finding a letter written nearly seventy years ago, when the Garden was only a gleam in Dr. Britton's eye. Moreover, Elmer N. Mitchell photographed the Administration Building, made a handsome enlargement of it, and also prepared the enlarged portrait of T. H. Everett requested by Mr. Hubbard, from a negative in Mr. Everett's own files.

The exhibition mentioned was arranged in the three wings of the Herbarium and Library, to serve as an introduction of Kew's many contributions to our knowledge of all branches of botanical science during the past two centuries, 1759-1959, and to illustrate the varied nature of the botanical researches and official advisory work now being carried on by this great institution. A most helpful feature was a thirteen-page guidebook containing clear and authoritative explanations of each of the fifty-six exhibits (a copy has been deposited in The New York Botanical Garden's Library). The exhibition was an enormous success, because each individual exhibit offered something attractive to every level of botanical interest. Moreover, attending many of the exhibits, especially those relating to present-day researches, was the investigator himself, who could answer questions and elaborate as much as necessary on his work. Exhibit 33, "The Influence of Kew on the Study of the Flora of North America", quite naturally interested an American because of the early botanical exploration and study initiated in Great Britain that culminated in Sir William Jackson Hooker's FLORA BOREALI-AMERICANAE (1833-40). Of special interest to me, of course, was the exhibit of letters exchanged between Dr. Britton and Dr. Thiselton-Dyer, the photograph of our Administration Building and the portrait of T. H. Everett, who holds the National Diploma in Horticulture from Kew.

Because of this historic relationship of The New York Botanical Garden to Kew, it seemed especially important and appropriate for the Garden to be represented at the Bicentenary celebration in order to extend officially its greetings and congratulations. The invitation, first extended in April by Dr. George Taylor, Director of the Royal Botanic Gardens, was followed later by a handsome official invitation in gold script: "To mark the Bicentenary of the Royal Botanic Gardens, Kew, the Minister of Agriculture, Fisheries and Food requests the honour of the company of the Director of The New York Botanic Gardens and Lady at a Garden Party at the Royal Botanic Gardens, Kew, on Tuesday, the 2nd of June, 1959, from 3:00 p.m. to 6:00 p.m. Her Majesty The Queen and His Royal Highness The Prince Philip, Duke of Edinburgh, have graciously consented to be present." This invitation was accepted promptly and with pleasure.

The London Times for Wednesday, June 3rd, gives a concise and accurate account of the actual garden party:

"In perfect weather the Queen and the Duke of Edinburgh spent two hours at a garden party at Kew yesterday to mark the bicentenary of the inauguration of the Royal Botanic Gardens. The Princess Royal was present.

"The royal visitors were received by Lord Munster, Lord Lieutenant of Surrey, Mr. Hare, Minister of Agriculture, and Mr. Molson, Minister of Works.

"While the Duke visited the herbarium, the Queen drove in an open Land-Rover along the Syon vista to see the new flagpole—a Douglas fir more than 220 ft. high which has been given by lumber interests in British Columbia.

The Queen visited the Palm House, which has recently been restored at a cost of £100,000, and then joined the Duke for tea in the restored Orangery, which has orange trees once more. After tea the Queen and the Duke met the botanists and horticulturists from the Commonwealth, the Continent and the United States."

Needless to say, the presentation of the visiting botanists and horticulturists to the Queen and to Prince Philip was a pleasant surprise indeed—and a privilege that few of us would have anticipated during our lifetimes. The whole ceremony was beautifully arranged, impressive and colorful—something that few of us are apt to forget. Several prominent botanists from overseas were among the official guests, many of them accompanied by their wives, as follows: Professor Charles Baehni, Director, Conservatoire et Jardin Botaniques, Genève; Dr. Stefan Bialobok and Dr. J. K. Browics, Institute of Dendrology, Kornik, Poznan, Poland; G. C. K. Dunsterville, Caracas, Venezuela; Dr. Knut Faegri, Director, Universitetets Botaniske Museum, Bergen; Professor R. Florin, Director, Hortus Botanicus Bergianus, Stockholm; Dr. Ernst Floto, Curator, Botanical Garden, Copenhagen; Dr. Glocker, Director, Botanisches Garten, Dortmund; Dr. Jesús M. Idrobo, Instituto de Ciencias Naturales, Bogotá, Colombia; Professor K. N. Kaul, Director, National Botanical Gardens, Lucknow; C. H. Lankester, Cartago, Costo Rica; Professor Bertil Lindquist, Director, Botaniska Trädgard, Göteborg; Dr. Wessel Marais, National Herbarium, Pretoria; Dr. Hans Melchior, Director, Botanisches Museum, Berlin-Dah-

(Continued on page 200)

ROYAL BOTANIC GARDENS
Kew, Richmond, Surrey

27th July, 1959

Dear Dr. Steere,

Your gracious gesture in devoting much of this number of The Garden Journal to matters connected with the Bicentennial of the Royal Botanic Gardens, Kew, is one which is sincerely appreciated by all who are or have been associated with Kew.

You have been good enough to acknowledge the influence of Kew in the establishment and development of The New York Botanical Garden, but any debt has been more than repaid in the interchange of ideas and material between our two institutions over the last sixty years.

The best wishes of the Kew staff go to those who labour in The New York Botanical Garden, with grateful thanks for all the fruitful cooperation in the past and in the confident expectation of similar and increasing partnership in the years ahead.

Sincerely yours,
(Dr.) GEORGE TAYLOR
Director

Dr. William C. Steere,
Director,
The New York Botanical Garden,
New York 58,
U.S.A.

THE ROYAL BOTANIC GARDENS, KEW—1759-1959

By **J. Robert Sealy**

The author is a member of the scientific staff of the Royal Botanic Gardens.

KEW GARDENS, for that is the name in general use now as it has been for two hundred years, occupy an area of more than three hundred acres alongside the River Thames between the village of Kew in the north and the environs of the town of Richmond in the south. The Gardens are about a mile long from north to south, and increase in width from about five hundred yards at the Kew end to about eleven hundred yards at the Richmond end. They are bounded on the west by the Thames and on the east by Kew Road (the main road from the bridge over the river at Kew to Richmond) which was constructed by George III in 1767 in return for the closing of an ancient lane which once divided the Gardens lengthwise. From Kew Road the Gardens are separated by a high brick wall.

Probably the first thing that a visitor to Kew notices is the diversity of the Gardens and their air of spaciousness —everywhere one turns the view is different and there is something to see. And probably at the same time the lawns will be noticed, for, with the exception of the hard paths and the beds and borders in which the plants are grown, the whole area is under grass which is kept mown and over which the public is free to walk—or sit. After a while the visitor will become aware of an air of quiet and seclusion, and, unless near the Kew Road boundary, will find difficulty in believing that roads and streets and houses are not far away, so effectively have trees been used to screen off the surroundings. The Gardens are, in fact, heavily wooded, but this is not so apparent as it might be, since the long broad grassy tree-lined vistas which are a feature of Kew, the shorter informal grassy vistas, winding paths, and curved borders break up the woodland and shrubbery to provide delightful views and an ever-changing scene. Then too, skilful use has been made in the landscape of the buildings — glasshouses, museums, the Pagoda, and the various "temples," of Greek and Roman design, which remain from an earlier age when such things were regarded as fitting embellishments of gardens and pleasure grounds. Mounds and shallow slopes and depressions add diversity to the terrain, while good use has been made of the Lake (which is wholly artificial) and also, though in a more formal manner, of the Pond, which is fed by a spring and has been constructed where once were shallow stretches of water and marsh. Formal bedding along the Broad Walk, near some of the houses, and in a few other places, adds at Kew a touch of order and formality in an otherwise largely informal garden.

So natural does much of the Gardens appear, that it is difficult to believe that they are wholly man-made. And yet that is the case. The site has little to recommend it for a botanic garden. The terrain is quite flat; the soil is dry, poor, shallow and overlies river gravel, while the atmosphere is frequently polluted with an abundance of soot which is most inimical to evergreens, particularly conifers. To add to the difficulties from the gardening point of view, the Gardens are open to the public and large crowds have to be accommodated, while, since Kew is a botanic garden, the trees, shrubs, and other plants have to be grown for study and comparison irrespective of their value in the landscape.

The Pagoda, a famous landmark, is as solid today as when it was built in 1761-2.

The vast collection of trees and shrubs, which occupies so much of the Gardens, is, in fact, planted for the most part in botanical families, and, despite the disadvantages of soil and climate, the deciduous plants grow very well indeed. On such flat ground this large collection of woody plants could have made the Gardens most monotonous, but, as already indicated, by skilful landscaping the grounds actually present a most diversified appearance. Another device which helps to beautify the Gardens is to make bold plantings which provide spectacular displays of colour at various periods of the year. Thus in early spring drifts of snowdrops, crocuses, and daffodils delight the eye, to be followed by the flowering of large groups of Japanese cherries and, a little later, by a clump of *Malus floribunda*. In May thousands of people come to Kew to see the great sheets of bluebells *(Endymion (Scilla) nonscripta)* which carpet the woodland, part of which — the area known as Queen's Cottage Grounds—is left in a semi-wild state in accordance with the wish expressed by Queen Victoria when she gave it to the Gardens in 1897. Varieties of lilac are planted together to provide a mass of colour, as are azaleas; Rhododendron Dell is another special attraction, and so too, in their season, are the iris and rose gardens. And, of course, many of the trees and shrubs are very handsome at different periods of the year, in young leaf, in flower, in fruit, or in autumn colours.

In addition to the trees and shrubs, a large collection of herbaceous plants is grown out-of-doors at Kew. These plants are partly accommodated in the Rock Garden, partly in the Aquatic Garden, partly in borders for ornamental purposes, and partly in a walled

Sion Vista with the Palm House in the distance.

garden where they are planted in rectangular beds arranged in plant families. In earlier days what are now known as families were called "orders", and at Kew we still refer to these beds by their ancient title of Order Beds, which, at least, is not open to the misunderstanding possible with "Family Beds".

The remainder of the living collection is grown under glass, and the five acres of greenhouses hold a large number of species which do not thrive out-of-doors at Kew, and for which conditions varying from cool temperate to the hottest tropics are provided. The largest single house is the Palm House, one hundred and twenty yards long and comprising a transept one hundred feet wide and sixty-six feet high, and two wings each fifty feet wide and thirty feet high. It is over one hundred years old and has recently been completely renovated, so that it is now good for at least another century. In this most beautiful house is grown, as its name implies, the collection of palms; with them are the cycads (including one which was sent to Kew by Francis Masson in 1775) and screw-pines *(Pandanus),* and a large selection of woody plants, including lianes, from the tropical regions of the world.

Our biggest range of glass is the Temperate House, which actually comprises five houses; there is a central house two hundred and sixteen feet long, one hundred and forty feet wide, and sixty feet high, with an octagon-shaped house fifty feet in diameter at each end; from each of these one passes into another house one hundred and sixteen feet long, sixty-four feet wide and thirty-eight feet high, while to one side is an annex built to accommodate rhododendrons. In this range of houses cool to warm temperate conditions are provided for a wide selection of plants from the extra-tropical regions of the earth.

Close by is the new Australian House, built in 1951, a new type of glasshouse designed to provide the maximum amount of light for plants from the drier parts of Australia. It is ninety feet long, fifty feet wide and thirty feet high, and the glass is held in a framework of an aluminium alloy.

Another large range of glasshouses is the T Range, so named from its shape. The cross-bar of the T comprises a large house (No. 10) with a tank in which the giant water-lily, *Victoria amazonica,* is grown during the summer, with orchid houses on one side and houses containing economic plants on the other side; and at right angles to these, forming the stem of the T, a line of three houses joined end to end extends away from No. 10. These houses are respectively the Stove, the Begonia House, and the Cape House (No. 7) which between them contain a wide variety of tender plants under tropical, subtropical, and warm temperate conditions. In addition there are in the T Range small houses devoted to *Nepenthes,* pelargoniums, insectivorous plants, and succulents.

Nearby is the main Succulent House (No. 5), recently rebuilt, and containing an excellent representation of plants of succulent habit from all parts of the world. The fine collection of ferns fills a number of houses grouped together, while aroids and other herbaceous plants from the tropics are accommodated in a special house (No. 1), as are the tropical water-lilies, which are grown in No. 15 along with tropical swamp plants, lianes, and members of the Cucurbitaceae.

Alpine plants also have a special house. These plants are grown in pots and pans in frames, and are brought into the house at flowering time, and taken back to the frames when flowering is over. For six or seven months of the year this house is filled with beautiful and interesting plants.

Finally the Conservatory, a cruciform house one hundred and fifty-six feet long, the ends twenty-two feet wide, and the transept seventy feet long and thirty-five feet wide, is kept gay throughout the year with an ever-changing selection of decorative greenhouse plants. All these houses are open to the public, but in addition there are many propagating houses to which the public is not admitted.

Though the Gardens form a greatly appreciated pleasure ground for the general public, and a source of inspiration and instruction to those who are horticulturally minded, their primary function is, as indicated above, to grow as large a collection of plants as possible for scientific study. Kew is, first and foremost, a botanical institution concerned chiefly with the classification and naming of plants, though it also has a considerable interest in plants of economic value as, indeed, has been the case throughout much of its history. The scientific activities are mainly centered in the Herbarium and Library. The collection of dried specimens which forms the Herbarium totals over six millions, and is housed in cabinets in three large buildings ("wings"), two of three floors and one of four floors. The wings are connected to one another and to an old Georgian house which contains offices and part of the Library, the remainder of the latter being in the three corridors which link the house to one of the wings. The Library, which is almost entirely botanical, contains over fifty-five thousand volumes ranging in date from the

earliest printed herbals to the most recent publications, and is world-wide in scope; it is one of the finest of its kind in the world.

Working with the herbarium material and the literature, the botanical staff study plants from all parts of the world and publish their findings in the form of floras, monographs and revisions of families and genera, and articles on species and nomenclature. Much of their time is spent in naming collections of plants and describing the new genera and species which come to light. At the moment the flora of Africa is very much to the fore, and new floras of tropical East Africa and central southern Africa are in active preparation, while a new edition of the FLORA OF WEST TROPICAL AFRICA—the first edition of which was prepared at Kew before the last war—is now in the press. In addition, floras of Cyprus and Iraq are also being prepared. Many enquiries and requests for information are received from botanists (and others) all over the world, and these, with the numerous specimens of cultivated plants sent in for naming, provide a considerable amount of work for the scientific staff. Botanists from all parts of the world come to Kew to study the rich collections and to take advantage of the comprehensive library facilities.

A different type of botanical work is pursued in the Jodrell Laboratory, for here the main interest is in the anatomical structure of plants, with special reference to their taxonomy; here also physiological investigations are carried out. Cytogenetical studies will also form part of the activities of the Laboratory in future, for the appointment of staff for such work has recently been approved. This department also receives many requests for assistance in determining the nature of plants by microscopical examination.

The third scientific department is the Museums of Economic Botany. There are three museums in the Gardens, and they contain an extensive collection of useful plants and plant products—timbers, fibres, cereals, fruits, drugs, gums and resins, and so on. Part is on show to the public and the rest forms the reference collection. Enquiries about economic plants and products are received from all over the world and investigations into the problems submitted occupy much of the time of the staff. Throughout much of its history Kew has been instrumental in transferring plants of economic value from one part of the world to another, and this work is still carried on. In the quarantine houses at this moment bananas, cotton, tea, cocoa, and rubber plants are being propagated and grown for dispatch to various places abroad directly it is certain that they are free from disease and pests.

The present-day Gardens were formed principally from two erstwhile royal properties; the eastern part was the grounds of Kew House, while the western section was once part of the demesne of Richmond House. Royal associations with these properties began in 1721 when George, Prince of Wales, son of George I, purchased from the Earl of Arran the house known as Ormonde Lodge and the grounds that went with it. The house itself was situated near the present southern boundary of the Gardens, but the grounds extended from the vicinity of the ancient royal palace at Richmond (founded by Edward I, rebuilt by Henry VII who died there in 1509, and largely demolished about 1650) almost to Kew nearly two miles away to the north. At the Richmond end the grounds covered a wide expanse of land (now occupied by sports fields and a golf course) and thence they tapered off towards Kew. The house, whose name seems soon to have been changed to Richmond House, became a favourite residence of the Prince and his wife Caroline, and continued to be so after they became King and Queen in 1727.

Caroline devoted much of her time, and spent vast sums of money, in improving the garden and pleasure grounds with the assistance of Charles Bridgeman, a noted landscape gardener of the time, whose *forte* was the laying out of wildernesses and forests with winding woodland walks. He introduced the Ha-ha, or moat, as a boundary instead of a wall or fence, the object being to allow an unimpeded view from the grounds across the adjacent countryside. To this day the river side of the Gardens is bounded by a Ha-ha, which extends beyond the present Gardens as a boundary for the golf course and playing fields mentioned above, while on the farther side of the latter a dry Ha-ha forms the boundary for three hundred yards or so.

Part of the site of the original botanic garden started by Princess Augusta in 1759. The tree on the extreme right is the Constantinople hazel *(Corylus colurna)* believed to be one of the original plants of the botanic garden as also the two trees on the extreme right, namely, the false acacia *(Robinia pseudoacacia)* and the maidenhair tree (*Ginkgo biloba*), both planted in 1762. The tree in the foreground is the black walnut *(Juglans nigra)* and the two behind it are cedars.

Dutch House purchased in 1781 by George III, as it stands today; now known as Kew Palace.

Bridgeman followed William Kent, who was responsible, among other things, for a number of curious buildings which ornamented the grounds, the most famous being Merlin's Cave, a thatched edifice which contained wax effigies of the wizard, of Queen Elizabeth I, of Elizabeth wife of Henry VII, Minerva, and others. Caroline was also assisted, or perhaps one should say aided and abetted, by Stephen Duck, a man of humble birth whose poetry brought him to the notice of the Queen; through her patronage he became a minister of the Church. Under Caroline's suzerainty Richmond Gardens became very well known and generally, it would seem, admired. She died in 1737.

After that date nothing more was done to the gardens until 1760, when George II died and was succeeded by his grandson, George III, who had himself lived much at Kew with his parents. George III took over Richmond House as his country residence, and very soon afterwards he had the grounds remodelled by Lancelot ("Capability") Brown—the leading landscape gardener—and all Queen Caroline's work was swept into oblivion. That this did not please everyone is evident from the following, which appeared in 1773:

> "To Richmond come, for see
> untutor'd *Brown*
> Destroys those wonders that were
> once thy own.
> Lo! from his melon ground
> the peasant slave
> Has rudely rush'd and
> level'd *Merlin's Cave,*
> Knock'd down the waxen wizard,
> seized his wand,
> Transform'd to lawns what late
> was fairy land;
> And marr'd with impious hand,
> each sweet design
> Of *Stephen Duck* and good
> QUEEN CAROLINE!"

Much of the area south of the house, that is towards Richmond, was laid down to grass so that George III could indulge his fancy for farming, and under grass it remains to this day. It no longer forms part of the Gardens, but Queen's Cottage, which George III had built for his wife Charlotte, is still a picturesque feature of Kew.

Kew (the name is a corruption of the twelfth century Cayho or Kay-hoo, a 'kay' i.e. quay on a 'hoo' a spit of land) has a long association with botany and horticulture. William Turner (died 1568), the author of the first botanical books written in English, had a garden at Kew and mentions it in his Herbal, ed. nov. p. 136 (1568), but where it was situated is not now known. In his Diary, John Evelyn refers several times to Lord Capel's garden at Kew, which seems to have been specially notable for its fruit, and it was this garden which Frederick, Prince of Wales and son of George II, took over when in 1731 he obtained a long lease of Kew House from the Capel family. The grounds extended from Kew for nearly a mile towards Richmond alongside the grounds of Richmond House, the two properties being separated only by Love Lane, an ancient bridle-way from the palace at Richmond to the horse-ferry across the River Thames between Kew and Brentford, and so on to the highway to London. At this time there was no bridge across the Thames anywhere in the neighbourhood, and the place between Kew and Brentford, where the river could be crossed easily, still retained the importance that it had possessed from pre-Roman times.

Frederick and his wife, Princess Augusta, seem to have become greatly attached to Kew and lived there a great deal with their family, which included the future George III. The house, which became known as White House, seems to have been extensively remodelled for them, and the Prince apparently took an active part in improving the grounds, which, as was the fashion at that time, were embellished with a number of curious buildings, such as a Gothic Cathedral and a Chinese summerhouse known as the House of Confucius. Frederick died in 1751, but Princess Augusta continued to live at Kew, and about 1756 a new phase of alterations to the house and embellishment of the grounds began.

William Chambers, who became one of the most famous architects of his time, was engaged, and during the period 1758-62 he designed and superintended the erection of a number of buildings, some of which survive to this day. They are the Temple of Arethusa (built 1758), the Temple of Bellona (1760), the Ruined Arch (1761), the Orangery (1761), and the Pagoda, perhaps the best-loved of all Kew's buildings and a famous landmark, built 1761-2 and as sound today as when it was new. Another building, the Temple of Aeolus, which stands on the Mound near Cumberland Gate, was built in 1845 from Chambers' plans, after his own building on the same site had fallen into decay. In addition Chambers was commissioned to design and erect a large hothouse, one hundred and fourteen feet in length and the largest in the country, which became known as the "Great Stove" and

stood for a century, being pulled down in 1861. This was, doubtless, meant to be complementary to the "exotick" or "physick" garden which was being developed at the time—a collection of plants grown for their intrinsic, as against purely decorative, qualities, a botanic garden in fact. It was commenced in 1759 when Princess Augusta engaged William Aiton, who had worked under Philip Miller (the leading gardener of the day) to lay out nine acres of her grounds for it, and hence the bicentenary of Kew Gardens is being celebrated this year.

For the successful creation of a botanic garden, botanical knowledge is necessary. To what extent Princess Augusta possessed such knowledge is not known, but John Stuart, Earl of Bute, who was her friend and advisor, most certainly did. He was a keen botanist and had a herbarium and an excellent botanical library, which were housed in a special building at Kew from the garden of which there was direct access to the grounds of Kew House. Bute, who was himself the author of one of the rarest of botanical works—"Botanical Tables containing the different Familys of British Plants . . ." (1785)—had water-colour paintings made of many of the plants grown at Kew; he also encouraged John Hill, a prolific writer on plants, to pursue his botanical studies, which Hill did to such an extent that when he died his wife was left in straightened circumstances—or so the lady alleged in a pamphlet she published. John Hill—he styled himself Sir John Hill after receiving an order from the King of Sweden—evidently assisted in the management of Princess Augusta's garden, and in 1768 he published an account of the collection which then numbered thirty-four hundred species. But that Bute was responsible for bringing the collection together, and was *de facto* Director of Kew, there can be little doubt, and there is a note by Peter Collinson, a well-known botanist of the time, which reads:

> "This spring 1762, all the Duke of Argyll's trees and shrubs were removed to the Princess of Wales' garden at Kew, which now excells all others, under the direction of Lord Bute."

Bute had been a friend of the Princess's husband and became her son George III's first Prime Minister and was, in consequence, the most hated man in England for the short period that he held office. He remained the unofficial Director of Kew until Princess Augusta died in 1772. Five of the trees planted in the original botanic garden still survive, notably a fine maidenhair tree *(Ginkgo biloba* L.), a tree of the Constantinople hazel *(Corylus colurna* L.), a fine Turkey oak *(Quercus cerris* L.), *Robinia pseudacacia* L. and *Sophora japonica* L., the last two now very decrepit.

Immediately after his mother's death George III purchased the freehold of Kew House and its grounds, and so became the owner of the whole of what is now Kew Gardens, though the property was still divided into two by Love Lane. As early as 1765 the King had obtained powers to close this ancient bridle-way, but it was not until 1802 that the lane was at last closed to the public and incorporated in the Gardens, which thus became a single entity. Soon after purchasing Kew House, George III went there to live and had Richmond House demolished. It was no doubt because of this that the combined gardens retained the name Kew Gardens.

In 1771 Joseph Banks (afterwards Sir), a wealthy gentleman keenly interested in botany, who had accompanied Captain Cook on one of his voyages of exploration round the world, was presented to the King, and the following year, when the King took over his mother's garden at Kew, Banks became his advisor and the unofficial Director of the Royal Gardens. And so he remained until his death forty-eight years later. In 1778 Banks became President of the Royal Society and from that time onwards he was the dominating figure in the botanical and horticultural world. Banks possessed a very fine herbarium and a first-class botanical library, and employed a botanist to look after them and to name and describe new plants; he also employed an artist to make drawings of the plants. With these resources he was able to give effective botanical direction to the development of the Gardens, which it was his declared intention to make the finest in the world. No efforts were spared to acquire new plants and to see that they were correctly named. Collectors were sent to all parts of the world, the first being Francis Masson who went to the Cape (South Africa) in 1772; he was one of the most successful collectors and sent home upwards of four hundred living plants as well as many packets of seeds—one of his plants, a cycad, is still growing at Kew.

In the years 1776-9 David Nelson was with Cook on his third voyage of exploration as collector for Kew, and

The Queen's Cottage, built for George III, which Queen Victoria gave to Kew Gardens in 1897.

in 1788 he and another Kew man, William Brown, were with Bligh on the ill-fated voyage of the "Bounty". Nelson remained with Bligh after the mutiny but died soon after reaching Timor—a few days after Bligh had obtained permission for him to go about the country and collect plants! Incidentally, this voyage exemplifies an other activity fostered by the King and Banks, namely, the transference of useful plants from one part of the world to another, for it was undertaken with the object of introducing into the West Indies the bread-fruit of the South Seas. This was achieved a few years later when Bligh sailed again, this time in the "Providence," and again accompanied by a Kew man, Christopher Smith. And on his return to England Bligh brought with him a collection of plants made by Smith for the Royal Gardens.

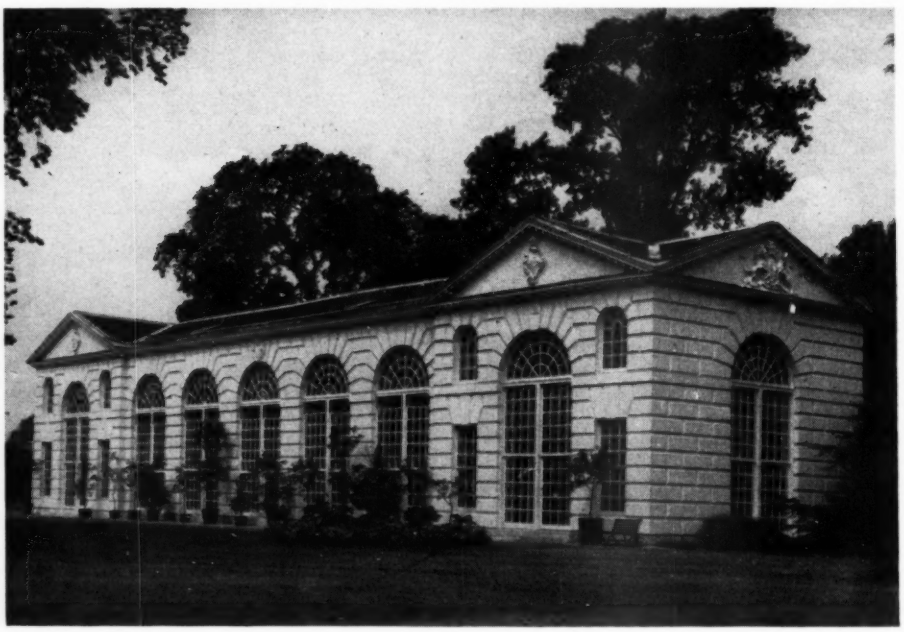
In 1796 Peter Good was sent to Calcutta for plants, and in 1801 went as collector on one of the expeditions exploring the coast of Australia, from where he sent home large collections of plants before he died in 1803. Also in 1801, another Kew man, George Caley, was sent to New South Wales as collector, and two years later William Kerr was sent to China. For two years, 1814-16, James Bowie and Allan Cunningham collected in Brazil, and then Bowie went to the Cape and Cunningham to Australia. And in that same year 1816, James Hooper was attached as collector to an embassy to China, and David Lockhart was sent to the Congo.

As a result of all this activity, the Kew collections grew rapidly. Whenever a new plant flowered, it had to be submitted to Banks' librarian for describing, and to Banks' artist—who from 1790 onwards was the famous Francis Bauer—for a drawing to be made. Much of this botanical work remains unpublished, but on it were based William Aiton's HORTUS KEWENSIS (1789), an enumeration of the fifty-five hundred species then in cultivation at Kew, and the second edition (1813) by William Townsend Aiton, which with the EPITOME (1814) included over eleven thousand species. William Aiton was the gardener who laid out Princess Augusta's botanic garden, and when he died in 1793, he was succeeded by his son, W. T. Aiton, as "Gardener to His Majesty". The botanical work in both editions was done by Banks' librarians. That in the first edition was largely based on the work of Daniel Charles Solander, who had been a favourite pupil of Linnaeus; he was highly regarded by his contemporaries who gave him the credit for putting the naming of cultivated plants on a firm basis. Solander died in 1782 and the HORTUS KEWENSIS was finished off and edited by his successor Jonas Dryander, who was also responsible for much of the second edition. He died, however, in 1810, and the work was finished off by his successor, the great Robert Brown.

In 1781 George III purchased Dutch House, a large mansion built in 1631 and situated close to Kew House, and both houses were used by the royal family until 1802 when Kew House was pulled down. Dutch House stands to this day, the only survivor of the several large mansions which once existed in the neighbourhood. It is now known as Kew Palace, contains furniture and pictures, and is open to the public.

George III and Banks both died in 1820, and as Banks' herbarium, library and botanical drawings all went to the British Museum, Kew Gardens were at one stroke deprived of scientific direction and botanical facilities. W. T. Aiton, who was no mean botanist, became Director of Kew and carried on the Kew traditions as well as he could. He continued to have water-colour drawings made of new plants, employing first Thomas Duncannon, a young gardener from Edinburgh, who drew upwards of three hundred plates during the years 1822-26, and after him George Bond, a young Kew gardener, who was responsible for about seventeen hundred drawings in the next nine years. In 1836 a large conservatory was brought to Kew from Buckingham Palace and is still in use as a glasshouse, being, in fact, the tropical aroid house, No. 1; while in 1837 the Gardens were ornamented by yet another temple, now known as King William's Temple, the King being William IV who died just as the building was completed. Aiton had charge of other royal gardens besides Kew Gardens, and it is clear that, despite his efforts, Kew declined steadily during the reigns of George IV and William IV.

By the time that Victoria came to the throne in 1837 complaints about the condition of the Gardens had become serious enough to induce the Government to appoint a commission to investigate the matter. The commission duly reported but nothing was done until 1840, when it became known that the Earl of Surrey who, in his capacity of Lord Steward, had charge of the royal estates, was proposing to disperse the botanical collections and use the greenhouses for growing fruit. Pressure was at once brought to bear in Parliament



The Orangery, built in 1761, was restored this year to the purpose for which it was erected.

and, as a result, the botanic garden, now some fourteen acres in extent, was taken under public control, the rest of the Gardens — the vegetable garden and the so-called Pleasure Grounds — remaining the property of the Crown. Sir William Jackson Hooker, at that time Regius Professor of Botany in the University of Glasgow, was appointed Director of the Botanic Garden, and in April 1841 he took up his duties at Kew.

Sir William Hooker was then fifty-five years of age, a tall spare man, vigorous alike in body and mind, and a first-rate botanist who had already published two large works, namely a flora of North America, and, with G. A. W. Arnott, an account of the plants collected on Captain Beechey's voyage to the Pacific and South China; in addition, three volumes containing two hundred and thirty-one coloured illustrations of cultivated plants (his Exotic Flora), and many small works. He possessed a fine botanical library and a rich herbarium, which he brought with him to Kew, along with his own botanical artist, W. H. Fitch, whom he (Hooker) had trained. Fitch became one of the greatest plant illustrators.

Hooker was himself a fine artist and was a great believer in the value of publishing good illustrations of plants. His FLORA EXOTICA, for which he drew the plates as well as wrote the text, has already been mentioned. He discontinued it in 1832 when he became editor of a much older periodical, CURTIS'S BOTANICAL MAGAZINE. This had been in decline for some years, but under Hooker's management it quickly regained its former status as the leading periodical of its kind. For the first ten years Hooker not only wrote all the text and did all the editorial work, but he also drew most of the plates. He brought the Magazine with him to Kew and continued to produce it and to write the text, with Fitch as his artist. And at Kew the Magazine has remained ever since. It is still being published regularly, and well over ten thousand coloured plates have appeared in its 172 volumes. Hooker had also started another illustrated publication, his ICONES PLANTARUM, this time with black and white drawings of new and interesting plants in his herbarium. This work he also continued when he reached Kew, and it, too, is still being produced here. It now comprises thirty-six volumes with 3,572 plates.

From the start Hooker's policy was clear: botanical research was to be the most important activity at Kew; the living collections were to be increased, the Gardens were to be extended and developed, and the educational side of the establishment was to be stressed. Hooker opened the Gardens every day to the general public and, as his annual reports show, took great pride in the steady increase in the number of visitors. Attention was to be given to plants of economic importance, and Kew was to help in the transference of useful plants from one part of the world to another; and finally, botanical exploration was to be encouraged. At the time when Hooker came to Kew, his son Joseph, who was destined to become even more renowned as a botanist than his illustrious father, was serving as naturalist on Sir James Clark Ross's voyage of exploration in Antarctica (1839-43), and the younger Hooker's first task, when he joined his father at Kew, was to prepare an account of the botany of the voyage. This was eventually published in six large quarto volumes, two each on the flora of Antarctica (1844-7), New Zealand (1852-5), and Tasmania (1855-60), all of them illustrated by plates, mostly drawn by Fitch.

The elder Hooker very quickly began to develop the Gardens. In 1843 forty-five acres of the Pleasure Grounds were acquired for the Botanic Garden, and the following year the building of the Palm House was begun. This lovely building, designed by Decimus Burton, was made the focal point for the lay-out of the extended garden which was planned by the landscape artist W. A. Nesfield, the principal feature being a number of wide avenues, or vistas, radiating from the new house. In 1846 Hooker was allowed to take over the ground that had been the royal kitchen garden, and the Botanic Garden was thus extended to seventy-eight acres.

At the same time a building, which had been used partly as a fruit store and partly as quarters for the gardeners, became vacant and this Hooker saw could be used for a museum. He acted with characteristic energy. He himself had a considerable collection of objects suitable for a museum, and the Curator of the Garden, John Smith, had others. Into the building were put tables made by placing planks on trestles, and on these Hooker arranged the collection and labelled the various objects. He then invited the Commissioners of Woods and Forests, under whose charge Kew came, to visit Kew, and treated them to such an eloquent discourse on the value of exhibiting such things that he was given permission to adapt the building for use as a Museum of Economic Botany—much to the chagrin of John Forbes Royle who had been trying for years to persuade the East India Company to establish just such a museum in London. A few years after this, in 1851, the building of a second museum was commenced to the design of Decimus Burton; both museums are still in use. The extent to which the living collection was being developed can be appreciated from the fact that in 1850, after only nine years at Kew, Hooker could claim that the arboretum was the most complete single collection to be found anywhere.

During the years 1847-51 the younger Hooker was studying and collecting plants in India, notably in Sikkim, and the Khasia Hills of Assam. He returned home with immense collections made by himself and his friend Thomas Thomson, and to these were added others which flowed into Kew from India. Much of Hooker and Thomson's time after their return was spent in sorting and naming these collections, and in 1855 they produced the first volume of their projected Flora Indica. In 1859, when the East India Company was finally liquidated, the Hookers were allowed to take to Kew the collections of dried specimens which had lain for many years neglected and uncared for in the cellars of India House. And it was from the vast amount of material thus accumulated that the seven-volume FLORA of BRITISH INDIA (1872-97) was prepared, in place of the Flora Indica which proved to be too ambitious an undertaking. In addition to the Indian collections, Sir William Hooker received dried material from correspondents in other parts of the world, notably South America, while Charles Wilford, who was sent from Kew in 1857 to collect in the Far East, made valuable collections in Manchuria, Korea, Formosa, and Hong

Kong; and Richard Oldham, who was sent out to replace him in 1860, also contributed large collections, mostly from Japan and Formosa.

For the first twelve or thirteen years at Kew Sir William Hooker resided at West Hall, a large house about a mile from the Gardens, and there he had his herbarium and library. In 1853 two official residences adjoining the Gardens fell vacant, and one of them was made the official residence for the Director, while the other was adapted to house his herbarium and library. Both buildings serve their original purpose to this day. That same year, 1853, the herbarium and library of a Dr. Broomfield were presented to Kew, and the following year George Bentham, a wealthy gentleman and one of the greatest of botanists, presented his extensive herbarium and library to the Gardens and settled at Kew to work with the Hookers, with whom he was very friendly.

In 1855 J. D. Hooker was appointed Assistant Director at Kew and began to take a direct part in the management of the Gardens, the development of which continued apace. A house two hundred feet long was built for succulent plants in 1855, and the following year the Lake, which forms such an attractive feature of the Gardens, was constructed in an area from which vast quantities of gravel had been taken to make up the five and a half miles of paths that had been formed in the Gardens. In 1860 the building of the Temperate House was begun (the architect again being Decimus Burton), and the following year a new fern house was built. Also in 1861 a giant flagstaff, one hundred and fifty-nine feet high and formed from a single spar of Douglas-fir felled on Vancouver Island, was hoisted into place in the Gardens. Thus when Sir William Hooker died in 1865, six weeks after his eightieth birthday, Kew had been developed from a botanic garden of fourteen acres with no pretensions to being anything but a collection of plants, to a flourishing scientific institution actively engaged in botanical research, with a well-stocked garden of two hundred and fifty acres regarded as the finest in the world. Sir William had carried out his duties with unabated vigour to within four or five days of his death, and it can be justly claimed that Kew Gardens, as we know it, is largely his creation.

He was succeeded as Director by his son, Joseph Dalton Hooker, who continued to develop the Gardens, and the botanical work, on the lines laid down by Sir William. New avenues were planted, the lay-out of the formal bedding was re-organized, Berberis Dell was made, and in 1871-2 a pinetum was planted. The Aquatic Garden was constructed in 1879, and three years later the Rock Garden was built to accommodate much of the collection of 2,630 alpine and herbaceous plants left to Kew, along with his herbarium of European plants, by G. C. Joad. The Rock Garden, two hundred and seventy yards long, was modelled on a dry Pyreneen valley with a winding path, broad enough to allow the easy passage of a considerable number of visitors, throughout its length; the soil was thrown up on either side of this path, and against the banks so formed the rocks were set in such a way that the plants were easily visible from the path. Limestone was used—chiefly Bath oolite and waterworn limestone from the Cheddar cliffs with smaller amounts of marble and Portland oolite. In the years between the two World Wars, one end of the Rock Garden was rebuilt with sandstone, and this has been extended during recent years. J. D. Hooker was, first and foremost, a botanist, and despite all his cares as Director, and his many extra-mural activities—he was, among other things, a very active President of the Royal Society for six years (1873-8)—he continued his own botanical work and kept close watch on the scientific work of his staff. He was a great friend of Charles Darwin, whose confidence he enjoyed during the formation of the theory of evolution and the writing of the ORIGIN OF SPECIES, and whom he helped greatly with botanical advice.

In 1866, the year after Sir William Hooker died, the Government purchased his herbarium, a thousand volumes from his library, and his matchless collection of botanical drawings and portraits. These were incorporated with Bentham's, Broomfield's, and other collections at Kew, to form one herbarium and a single library which, with the ever-increasing accessions, rapidly outgrew the accommodation. In 1876 a large building, eighty-six feet long and forty-three feet wide, was erected for the herbarium at the back of the house in which the collections were kept, the house itself being then used for the library and office. That same year, the Jodrell Laboratory, named after its donor, T. J. P. Jodrell, was built and equipped with apparatus for anatomical and physiological studies. The first Keeper was D. H. Scott, who worked here with W. C. Williamson on fossil plants of the Coal Measures, notably on the pteridosperms; it was here too in 1883 that Walter Gardiner proved the continuity of protoplasm between living cells. Later on H. T. Brown and A. Escombe worked on physiological processes in green leaves, and G. Massee on fungi. In recent years work on the anatomy of the angiosperms has been the chief concern. In 1880-1 a picture gallery was erected in the Gardens, the North Gallery, built at the expense of Miss Marianne North, a talented and prolific painter of plants, to house the collection of paintings she had made in many parts of the earth; there are eight hundred and forty-eight paintings in all, made during the years 1872-85. This Gallery is open to the public.

Sir Joseph Hooker resigned from the position of Director in 1885 and was succeeded by his son-in-law, W. T. Thistleton Dyer, who had been Assistand Director since 1875. Dyer continued the same policies as the Hookers. He was responsible for great improvements in the landscape effects, and in particular for developing the beauty of the Lake, for the opening of long informal vistas which do so much to give spaciousness to the heavily wooded grounds, and for having much of the lawns relaid. The years 1887-99 saw much building and rebuilding of the greenhouses, starting with the Alpine House. At that time the practice of growing alpine plants in pots and pans in frames, and bringing them into a house to flower, was quite new, and the Alpine House proved a great attraction. It was enlarged in 1891 and rebuilt on a larger scale in 1939. Between 1889 and 1892 the Fern House was rebuilt and others added; the Conservatory was finished in 1894, and in 1899 the Temperate House, of which part had been built in 1864, was at last completed to the original design.

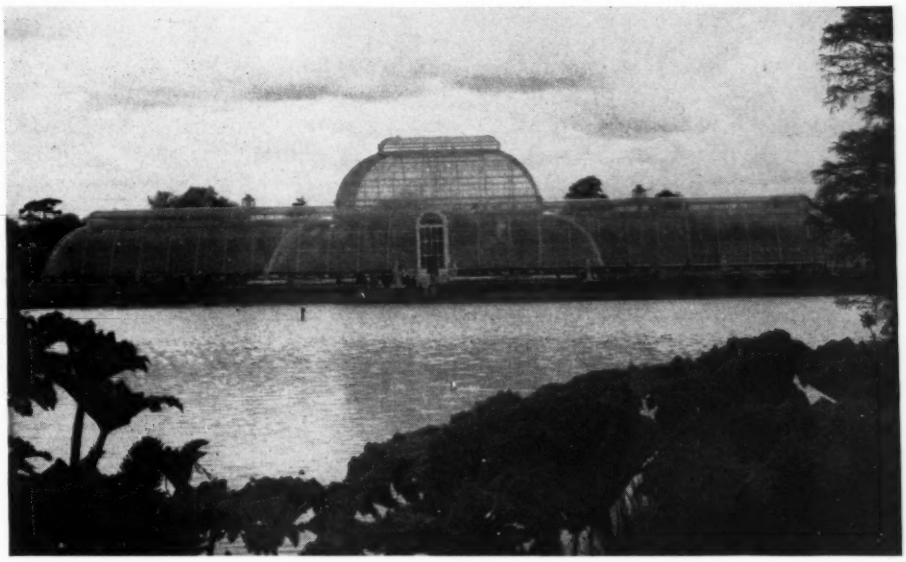
In 1890 Nathanial Lord Britton wrote to Dyer for information and advice

about the proposal to establish a botanic garden in New York. Dyer gave freely all the help he could, and later on, when The New York Botanical Garden came into being with Britton as its first Director, he gave as freely of plants to furnish the new garden. This was right in the Kew tradition, for throughout its history Kew has given encouragement to the establishment of botanic gardens and like institutions in all parts of the world, particularly those in the Commonwealth and Colonies, and has contributed freely advice, plants, and men. From the earliest days gardeners trained at Kew have been in demand in other gardens, and the supply has been kept up by the system whereby men with adequate practical training in horticulture come to Kew to work for two years or so, and are given courses of lectures on botany, horticulture, and related subjects. In addition the student-gardeners, as they are known, receive demonstrations in the Gardens and are, of course, free to study the collections for themselves, with a special library to work in. At the present time Kew-trained men occupy important posts in fifty-four countries.

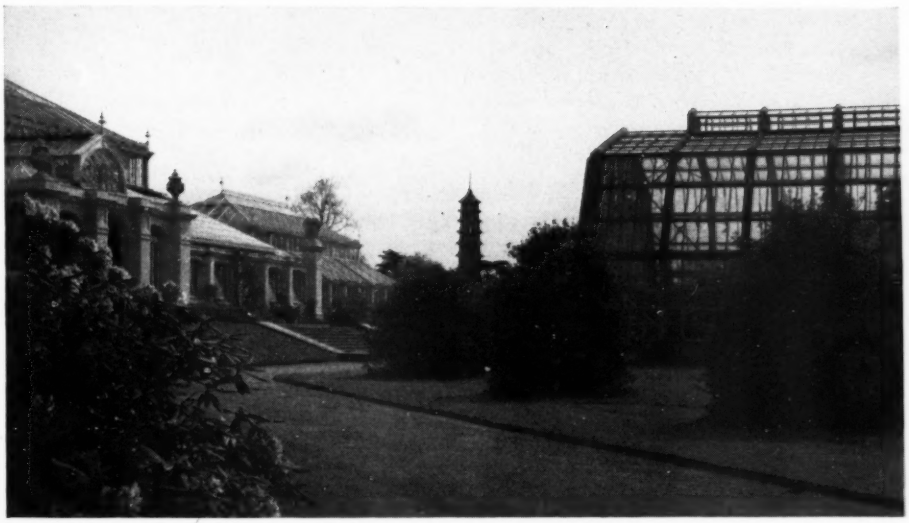
All through its history Kew has played an important part in transferring useful plants from one country to another. Two examples only can be given. First the introduction of *Cinchona,* the source of quinine, into India, whereby the scourge of malaria, which had been yearly responsible for a heavy toll of human life, was brought under control; and second the sending of one thousand seedlings of *Hevea brasiliensis,* the Para rubber tree, to Ceylon and Malaya in 1875, which led to the establishment of the rubber industry in those countries.

By the beginning of the twentieth century the Gardens had been developed to much their present condition. In 1904, however, Cambridge Cottage (so-named because it was the residence of the Duke of Cambridge) and its garden were given to the Royal Botanic Gardens by command of King Edward VII. The house was converted for use as a Museum, and so remains to this day; the garden, which is walled, contains many choice shrubs and a border devoted to blue-flowered plants. In 1919 the giant flagstaff was replaced by a larger one, two hundred and fourteen feet high; but this has recently had to be shortened, owing to decay, and will be replaced by an even taller spar received last year from British Columbia. Minor alterations and improvements are always being made in the Gardens, and houses are periodically altered or rebuilt. In 1932 a small house with a backcloth depicting a scene in the Mohave Desert was presented by Mrs. Sherman Hoyt, of Pasadena, California, to contain the American cacti which she had exhibited at the Chelsea Show in 1929; it is known as the Sherman Hoyt House and is still used for American cacti. Adjoining it is a small house in which small succulents, principally South African, are shown. This was built in 1935 to commemorate the Silver Jubilee of King George V. The only large new house is the Australian House, opened in 1952.

This year, 1959, the Orangery built by William Chambers in 1761, which had served as a museum for close on a hundred years, has reverted to its original purpose, while to commemorate the bicentenary of the Gardens a new rose pergola has been constructed through the Order Beds. In 1956 Kew received a gift of ten large stone figures of the Queen's Beasts, replicas of the figures of the heraldic animals which stood guard at Westminster during the coronation of the Queen and by the hand



The Palm House, after renovation, with the Queen's Beasts in position; leaves of gunnera margin the Pond in the foreground.



Part of the Temperate House, on left, and part of the Australian House, on right, with the Pagoda in the background.

of the same sculptor. They are now spaced along the foot of the Palm House terrace throughout its length facing the Pond, by the side of which, a short distance away, stand two more huge stone figures of fabulous beasts. These figures are Chinese lions, presented to the Gardens in 1957.

So far as the Herbarium is concerned, the past fifty-nine years have seen a great expansion. In 1901 a new building, similar to that erected in 1876, was commenced, and in 1930 yet another large wing was erected. The collections have grown so fast, however, that these wings are no longer sufficient, and plans are now being drawn up for another great wing.

It seems right to conclude this account of Kew by referring to some of the outstanding works that have been prepared here. The continued production of the BOTANICAL MAGAZINE and Hooker's ICONES PLANTARUM has already been mentioned, and so too have the Floras of Antarctica, New Zealand, Tasmania, and British India. Other full-scale floras are Bentham's FLORA HONGKONGENSIS (1861) and FLORA AUSTRALIENSIS (1863-78), Grisebach's FLORA OF THE BRITISH WEST INDIES (1859-64), Seemann's FLORA VITIENSIS (1863), the FLORA OF TROPICAL AFRICA (1868-1937), the FLORA CAPENSIS vol. IV-VII (1896-1933), J. D. Hooker's HANDBOOK OF THE NEW ZEALAND FLORA (1864-7), Baker's FLORA OF MAURITIUS and the SEYCHELLES (1877), Hemsley's BIOLCGIA CENTRALI-AMERICANA (1879-88), King's MATERIALS FOR A FLORA OF THE MALAY PENINSULA (1889-1909), Trimen and Hooker's HANDBOOK OF THE FLORA OF CEYLON (1893-1900), Cook's FLORA OF THE PRESIDENCY OF BOMBAY (1901-5), Collett's FLORA SIMLENSIS (1902), Duthie's FLORA OF THE UPPER GANGETIC PLAIN (1903), Ridley's FLORA OF THE MALAY PENINSULA (1922-5), Gamble and Fischer's FLORA OF THE MADRAS PRESIDENCY (1915-36), Hutchinson and Dalziel's FLORA OF WEST AFRICA (1927-36). Both Bentham and J. D. Hooker wrote floras of the British Isles, and Massee prepared a British Fungus-Flora (1892-5).

Other valuable works are Forbes and Hemsley, INDEX FLORA SINENSIS (1886-1905); Dunn and Tutcher, FLORA OF KWANGTUNG and HONGKONG (1912); Gamble, MANUAL OF INDIAN TIMBERS (1902); Brandis, INDIAN TREES (1906); Watt, DICTIONARY OF THE ECONOMIC PRODUCTS OF INDIA (1889-93); Burkill, DICTIONARY OF ECONOMIC PRODUCTS OF THE MALAY PENINSULA (1935); Hutchinson, FAMILIES OF FLOWERING PLANTS, Dicotyledons (1926) Monocotyledons (1934), ed. 2 (1959); Turrill, PLANT-LIFE OF THE BALKAN PENINSULA (1929); Nicholson, ILLUSTRATED DICTIONARY OF HORTICULTURE (1884-8), Supplement (1900), Bean, TREES AND SHRUBS HARDY IN THE BRITISH ISLES (1914; ed. 7, 1950); Wakefield and Dennis, COMMON BRITISH FUNGI (1950); Metcalfe and Chalk, ANATOMY OF THE DICOTYLEDONS (1950); Ross-Craig, DRAWINGS OF BRITISH PLANTS (1948—L).

The list of other publications on taxonomy, nomenclature, and other fields of botany is far too long to include. Much of the work is in the annual volumes of the KEW BULLETIN, which was started in 1887 and is still being produced, and in other periodicals. Three most important works remain to be mentioned. The first is the GENERA PLANTARUM (1864-83) by George Bentham and J. D. Hooker, which contains descriptions of all the genera of flowering plants known at the time, and was written wholly from first-hand examination of the material preserved in herbaria, an outstanding piece of work which in extent and thoroughness has never been equalled. Next the INDEX LONDINENSIS (1929-31) and Supplement (1941) in which are listed references to all the illustrations of plants published from 1753 to 1935—a most valuable work of reference to botanists and horticulturists alike. And finally the quite indispensable INDEX KEWENSIS, the register of all binomial names of plants with their place of publication. The original volumes listed the names published from 1753 to 1885, and their compilation was made possible by a bequest from Charles Darwin. Names published subsequent to 1885 have been listed in Supplements, which appear quinquennially; Supplement XII was issued this year.

Kew Gardens is two hundred years old and as active now, in both the botanical and horticultural fields, as at any time in its history.

BICENTENARY (from page 190)

lem; M. Arpad Plesch, Station Experimentale "La Leonina", Beaulieu S/-Mer, France; Dr. Walter Robyns, Director, Jardin Botanique de l'Etat, Bruxelles; Professor C. G. G. J. van Steenis, Director, Flora Malesiana, Rijksherbarium, Leiden; Dr. Georges Troupin, Lwiro-Bukaire, Congo Belge; Dr. P. Van der Veken, Jardin Botanique de l'Etat, Bruxelles; and J. H. Willis, Royal Botanic Gardens, Melbourne.

The Americans who attended the Garden party as official representatives of institutions were Mr. and Mrs. Henry F. duPont, Longwood Gardens; Dr. Joseph F. Rock, Honolulu, Hawaii; Dr. Frits Went, Director, Missouri Botanical Garden; and Dr. and Mrs. William C. Steere, The New York Botanical Garden. In view of the foregoing remarks, it seemed only appropriate that The New York Botanical Garden should have been well represented—by a member of its Board of Managers (Mr. duPont), a member of its Advisory Council (Mrs. Steere) and its Director (Dr. Steere).

Dr. George Taylor, Director of Kew, C. E. Hubbard, Deputy Director, and the other members of the staff at Kew are to be congratulated warmly not only for the basic fact of their institution's Bicentenary, but also for the beautiful arrangements of the celebration, of which every smallest detail had been anticipated and attended to. Out-of-doors, the Royal Botanic Gardens had been put in exact order, to the last leaf and the last border, and the roses and rhododendrons were at their season's loveliest. Let us hope that the perfect weather and the bright sunshine enjoyed at Kew on June 2, 1959, may be interpreted as an encouraging symbol for the next century—and one gains confidence already that the new Director of Kew is developing a bright and stimulating climate for progress in international botanical research.

One of the best ways to give real support to THE NEW YORK BOTANICAL GARDEN is to include it in your will. No matter how small the bequest may be, it will be useful and welcome, especially when it turns out to be one among many bequests.

Fuchsia magellanica

HORTICULTURAL IMPRESSIONS ABROAD

By Frederic Heutte

Mr. Heutte is Superintendent, Bureau of Parks and Cemeteries, and Director of the Norfolk Botanical Garden, Norfolk, Va.

FOR MANY YEARS Florence and I had planned a trip back to our homelands; for my wife homeland is Ireland, for me France. I had made a promise that it was not to be a busman's holiday and that the horticultural aspect of the journey was only secondary. I am glad that we started out that way, because it gave me a new perspective into the field which has kept me so preoccupied during my lifetime.

Our tour began in Rome on the Piazza della Republic in surroundings which will long linger in my mind. It was late afternoon and the sun was fast setting, casting its slanting rays across the central fountain (republic square) whose drifting mist produced prismatic rainbows. Around it a motley of never ending vehicles, typical of this great turbulent city—one side Romanesque pillared buildings, on the other the ultra-modern Stazione Termini (Central R. R. Station) at right angles to which terminates a portion of the old Roman Wall, left there I am sure for contrast. In and around the station were trimmed flower borders, and hanging from the crevices of the old crumbling wall were garlands of the wild valerian and cytisus. I could see a small park from which I stood—a perfect setting for a flower vendor from which were displayed magnificent calla lilies, carnations, roses, colorful hydrangeas and geraniums in pots. A church nearby completed a scene which I soon realized typified the moods and patterns of this great city.

I saw no particular horticultural gem. If there was one, it was over-powered by the masterpieces in stone and marble and the gushing fountains. But I was conscious of the love of the people of Rome for growing things—from geraniums and hydrangeas in pots perched precariously on window sills to ornate window boxes and jardinieres on the balconies of hotels and private residences. On the eve of Ascension Thursday, I saw the flower stalls empty into the hands of a devout people to be placed on their favorite shrines. The traffic was not so heavy and snarled on this Holy Day, but the churches were filled and alters laden with blossoms whose fragrance mingled with incense—a new perspective for a traveling horticulturist.

Of course, I saw the Villa D'Este whose elaborate series of fountain displays magnified the surrounding topography, as it did a single tubbed azalea so well placed that all of the hydraulic extravaganza seemed only there to herald its glory. I lingered along the century old plantings of olive groves which surround and guard Hadrians Villa. I admired the delicate patterns of a formal garden at the Borghese Gallery, where varied colored granite and marble chips played an important part in its composition. I saw city gardeners set out rhododendrons in full bloom out of six-inch pots to give color to circles and squares—but what I admired most, as I started on my journey north to the French border, were the countryside gardens, most of which were terraced, the neat vineyards, and the commercial culture of carnations and other flowers that spilled over into the equally rugged terrain of the French Riviera. I saw endless miles of retaining walls—not just plain walls because here and there from open niches were draped and meticulously fastened pyracanthas and roses and clematis, and the ever-present valerian where man forgot to take over. Here is a land where dictators left their images in marble and granite, but whose rise and fall did not obliterate the work that generations of craftsmen had fashioned into this fabulous "boot" of the continent.

Nature has a way of spilling over and pleasantly blending the varied topography, climatic zones and ways of people. This is seen at its best in crossing over from one Riviera to the other because, as I entered France, it took miles of travel before I felt that I was in another country.

In spite of my willingness to skip horticultural by-ways, Florence and I were met in Nice by an old friend, Jacques Legendre, who was written up a few months ago in the pages of THE GARDEN JOURNAL. It was not a chance meeting; we had arranged to visit together the famous Meilland rose breeding establishment. The day spent with Antoine Meilland, Mrs. Francis Meilland, widow of the famous hybridizer and creator of the rose 'Peace', and young Alain, the nineteen-year-old rose genius who is carrying on that famous name, was one never to be forgotten. There I became acquainted with new names in roses destined to invade many gardens: 'Grace de Monaco', 'Lourdes',

'Christian Dior', 'Danielle Darrieux' and one in particular 'Cocktail', a blazing Floribunda with a white center. Being guests of this remarkable and hospitable family in Antibes was one of the highlights of our trip.

Then on to Paris via the Cote D'-Azur on the famous Minstral Express. This eleven-hour train ride was most interesting, as we witnessed a gradual transition from the tropical to semi-tropical to temperate. Compared to the United States, France is a very small country, yet the architecture changes noticeably as one goes from one Province to another, even the dress of the people. Along the River Rhone a tremendous manufacturing upheaval is apparent; the most impressive from a horticultural standpoint is the vast quantity of grapes and fruit grown, not in large areas, rather in individual patches neatly trimmed. We noticed a peach orchard in espaliered manner, as the swift train slowed from its average of over one hundred miles per hour for some construction.

So much is written about Paris, the city of my birth, that I shall only say that truly it lives up to its reputation as the "City of Light". Horticulturally, I was somewhat disappointed. Although in the middle of May it was just putting on its garb for the tourist season, as I saw workmen planting geraniums and other annuals in its parks and parkways. The Jardins des Plantes is quite different from most botanical gardens in many respects, and it reflects a tremendous effort to keep plants in their proper perspective. I saw it as a tourist would without special guidance, in fact, I waited from noon until two o'clock, while workmen were having their lunch period complete with wine, bread and cheese, so that I could ask some cultural questions in my best French. I wanted to know, "How does Paris keep its thousands of trees so trimmed and clipped to form all of these pleached allees and vistas? Do you use some kind of mechanical clipper?" But, "Non-non", I was answered; "it is all hand work, no machine can do that." I tried to evaluate the cost, if I were to attempt to do this with the street and park trees of Norfolk, but I gave up. The only thing that I intend to do is to copy the French method of periodic "hard pruning", or dehorning as it may be called, on our street trees—sycamores especially. I saw many of Paris's quaint little parks, the Tuileries Gardens and that of Luxembourg, but I was satisfied to view its over-all beauty from the top of the Arc de Triomphe and the Eiffel Tower.

Then we left Paris by rented car for a tour of the Loire Valley and the Chateau country, that, of course, is a "must" for anyone. I never thought I would see *Laburnum watereri (vossi)* growing wild along my countryside, considering how I struggle to keep a pair of this shrub alive in my own garden, but there it was in full bloom in mid-May. Versailles and Fontainebleau were on our itinerary, and we admired the "Le-Notre masterpieces." The fountains were not in play and the flower beds were being prepared, but after all they only complement a genius's conception of landscape art in the "grand style." One must see such gardens to appreciate fully the terms "perspective", "proportion and scale", and "symmetry of design".

Valeriana officinalis

We caught a glimpse of rural life on the day spent in Normandy, as we stayed at Mont Saint Michel and visited the invasion coast. I was particularly interested in this section, because my ancestors came from the environs of Caen. I found some of my relatives still living much as they did a hundred years ago in picturesque thatched roof houses from the ridges of which grow the fleur de lis (the small bearded iris). We were there the week General DeGaulle was to open a new suspension bridge across the mouth of the River Seine—yes, our trip was full of coincidences.

Crossing the English Channel we met people from Norfolk; this had happened in Rome and was to happen again in Kew. What a small world we live in! As we drew near England I realized that I was about to come upon

(Continued on page 210)

Phyllitis scolopendrium

U.S. PLANT INTRODUCTION STATION AT COCONUT GROVE, FLORIDA

By Jeffrey E. Shrum, Jr.

This is based on the paper prepared by Mr. Shrum, then Research Agronomist of the Crops Research Division, Agricultural Research Service, U.S.D.A., for the annual meeting of the American Association of Nurserymen, held in Miami, Florida. Mr. Shrum is now Administrator of the Guatemalan Chemurgic Enterprise, in Guatemala.

GARDENS for testing new or little-known immigrant plants were recognized early by the United States Department of Agriculture as essential to the success of formalized plant introductions. Without ample growing facilities for handling plant introductions, all the effort and expense involved in obtaining plant germ plasm abroad would be for naught. But in specially equipped nurseries or gardens, seeds, cuttings and plants can be propagated and tested prior to distribution throughout the United States.

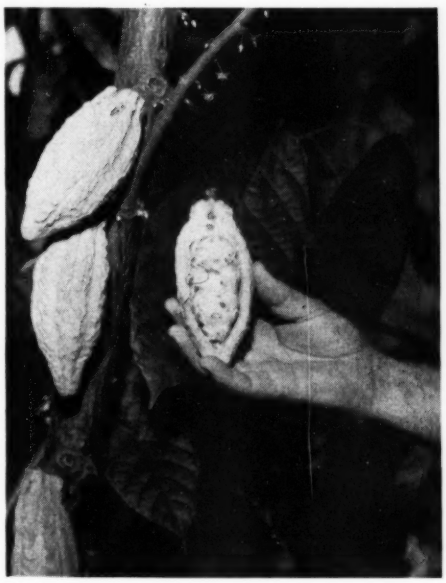
Thus 1898, the year that marked the formal birth of a regular federal program for plant introduction, saw also the establishment of the first federal plant introduction garden. This was a modest six-acre tract in Miami, Florida. The property was returned to the original owners when the plants were transferred to the garden established in 1922 near Coconut Grove. Here a program for the introduction, preliminary appraisal and distribution of plants—principally in the southern regions of the United States and its tropical possessions—has been carried out. This garden has also been active in seed exchanges with various foreign countries.

The site of the garden was selected by the late Dr. David Fairchild, a famous plant explorer, and others because its generally mild winter temperatures permit the planting of a wide variety of subtropical and tropical plants, some of which would not survive in other areas of the United States.

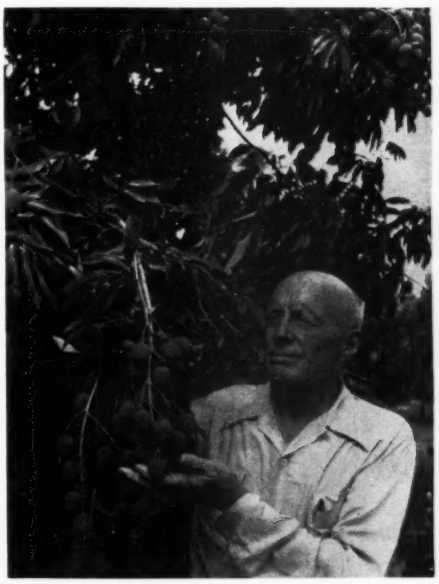
The largest acreage of the garden comprises what is known locally as high pineland, best described as a thin layer of sandy soil underlaid by soft oolitic limestone rock with a water table three to twelve feet below the surface. Surprisingly, most species of woody tropical plants will make satisfactory growth on this type of land.

Twenty-five acres of a mangrove swamp area were filled in, in 1917, with dredged marl to form a level airfield a foot or two above mean high tide. The rest of the garden land consists of scattered deep depressions in the limestone rock filled with a sandy soil down to the water table. These depressions, which total only a few acres, are notably different from the soil areas previously mentioned in that their soil reaction is generally slightly acid. These different ecological sites allow the testing of newly introduced plants under soil conditions similar to those found in large areas of subtropical Florida. Thus, it is possible to acquire, on the basis of plant survival and growth, important information on environmental adaptation of new plant introductions.

The Barbados cherry or acerosa, *Malpighia glabra*, is espaliered against a brick wall in Miami, Florida.



Woody fruit of *Theobroma cacao*.



The late Col. William R. Grove, holder of the Congressional Medal of Honor, established Florida's largest lychee orchard at Laurel. It is still operated commercially by William R. Grove, Jr.

Since the inception of the garden, over fifteen thousand and five hundred plant accessions have been received. Approximately thirty-seven hundred of these are represented by one to several established field plants. This large botanical collection has assumed world importance, because it represents one of the few locations where growing plants of many tropical plant species can be studied.

Slightly over half of the garden has been planted to tree, shrub, and vine genera. Especially noteworthy are collections of *Acacia* (26 spp.), bamboo (21 spp., of which 15 are in *Bambusa), Bauhinia* (26 spp.), *Cassia* (31 spp.), *Cordia* (17 spp.), *Erythrina* (15 spp.), *Eucalyptus* (37 spp.), *Ficus* (73

spp.), *Lonchocarpus* (9 spp.), palms (181, representing 82 genera), *Tabebuia* (12 spp.) and *Terminalia* (20 spp.).

Scattered across the country are three other federal and five regional cooperative stations, such as the one at Coconut Grove, which provide facilities for preliminary testing and screening of plant introductions prior to increases and distribution to research workers for use in their crop improvement programs. These stations are also repositories of valuable germ plasm being held for future research programs.

In addition to ornamental plants, collections of Indian and Philippine varieties of mango (63 introductions), avocado (78 introductions) and lychee (11 introductions) have been maintained at Coconut Grove, and have contributed directly and indirectly to the development of commercial plantings of these fruit crop plants in the United States.

The promising new clone of *Litchi chinensis,* recently distributed from this garden under the name of 'Bengal,' illustrates the continuing efforts of the staff to improve commercial fruit plants. Notable among other edible fruit plants being introduced and appraised as possible new crops is the Barbados cherry, *Malpighia glabra,* a shrub from southern Texas and the tropical Americas, which bears red berry-like fruit that is a rich source of vitamin C.

Early introductions of the para rubber tree *(Hevea brasiliensis)* proved this tropical crop could be grown to maturity on the deeper soils of the garden with only an occasional setback from light frosts that occur during the winter. During World War II the Coconut Grove Plant Introduction Garden became an important location for the study of woody rubber and latex-producing species in the genera *Achras, Castilla, Cnidoscolus, Cryptostegia, Ficus, Funtumia, Hevea, Nandolphia, Manihot, Mascarinhasia, Mimusops* and *Pelaquium.* It served also as an intermediate point of quarantine in foreign exchanges of clones of *Hevea,* which could not be made directly between commercial growing areas of both hemispheres without incurring the risk of transferring serious plant diseases and pests. This latter function of the garden is being continued, and, within the past few years, the scope of the program has been enlarged to include coffee, chocolate and other tropical crop plants, such as banana and pepper.

In recent years the garden has provided hundreds of root, stem, leaf and

(Continued on page 205)

The African oil palm, *Elaeis guineensis*

DAVID FAIRCHILD'S FRIENDS

By William J. Robbins

Dr. Robbins, Director Emeritus of The New York Botanical Garden, is Executive Officer of the American Philosophical Society with headquarters in Philadelphia.

A YEAR OR TWO before he passed away, I walked with David Fairchild from plant to plant in his garden at Coconut Grove, Florida, and sat and talked with him in his open-air potting shed.

I heard how he was introduced to the peach palm by Mrs. Hamilton Wright at a dinner in Newport, Rhode Island, after having stepped on the train of the lady's dress. Mrs. Wright had recently returned from exploring with her husband in Panama where the fruit of the peach palm is a major item in the diet of some of the natives, and where she had herself lived on it. Its fruit, said David Fairchild, tastes much like a chestnut and it is one of the few palms which reproduces by suckers.

I cracked a bael fruit *(Aegle marmelos)* on a rock and examined the mucilage which surrounds each seed and spins out to a spider web in thickness when the pieces of the fruit are pulled apart. I tasted its unripe flesh while I heard of its excellence, when ripe! and listened to an account of the Indian potentate who ate a bael fruit for breakfast every morning for thirty years.

David Fairchild and I discussed the gray palm *(Butea capitata)* which occupies huge areas in Argentina and from which such delicious jelly can be made. Red, tart, excellent with meats, it reminds me more of currant jelly than any other with which I am familiar. I tasted sapodilla fruits, sweet and refreshing, and the fruits of cannistel which resemble in color, consistency and lack of flavor the yolk of an egg. We examined together chayamansa *(Cnidoscolus chayamansa),* once used as a vegetable by the ancient Mayans and recently found to be rich in vitamin C. Fresh cuttings root, I was told, with difficulty, but if allowed to lie in the open until three or four inches of the

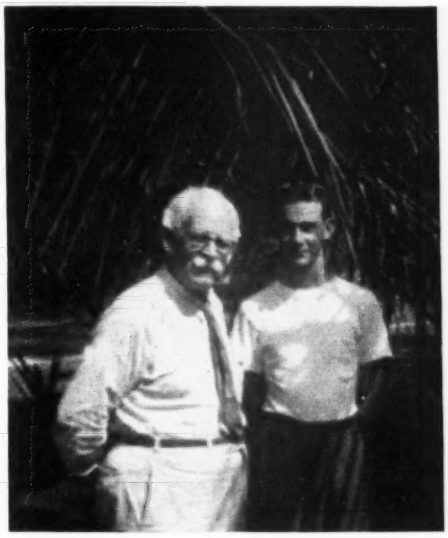
tip have withered away, they root with ease. We took a look at *Treplaris americana,* the American ant plant, so-called because it usually harbors numbers of vicious ants, and I heard what happened to David Fairchild in Venezuela when he felled one which was infested with ants. There was *Ficus roxburghi* with its fruits pushing up through the soil like mushrooms, and the red fleshy persistent sepals of *Clerodendron nunahasi* which look like flowers and have unusual water-secreting glands.

The world was, in fact, David Fairchild's garden and the plants in it his friends. He was never bored with these friends. Every year their mutual acquaintance became richer and more rewarding.

I should like to see more people follow in the footsteps of David Fairchild; become so well acquainted with plants, only one if there is time for no more, that they come to regard plants as old friends. Gertrude Stein once said "A rose is a rose is a rose." This reiteration emphasizes the point I wish to make. It is not enough to say a rose is a rose; a rose is far more than that. It may be a Lady Bank's rose which graces the garden and churchyards around Charleston. The Lady Bank's rose is a tender rose which cannot endure the rigors of the North; a generous rose in its vigor of growth, abundance of flowers, early flowering and sweet violet fragrance; an immigrant from China by way of England; a kindly rose because it is thornless; a rose with a pedigree. There are many roses—some of them recent upstarts, if you please—but each has an individuality of its own, as any rosarian will assure you.

I am not advocating anthropomorphism. I don't mean to suggest that plants are people. I do not agree with an acquaintance of mine who will not pick a flower or break a branch, because she cannot endure the thought of the pain she believes the plant must suffer. Like the person who will eat beef but consider with horror anyone butchering a cow, she will accept cut flowers but will never participate in murdering them.

As I listened to David and watched the tender attention he gave to his favorites, I thought how wonderful it is to regard plants as friends, each with its unique characteristics, its history, its traditions and, one might even say, its personality. What solid satisfaction there is in making the acquaintance of a plant. David Fairchild thought of plants in that way. They were not merely trees or shrubs or flowers, but friends, and it was his pleasure to use his good offices in making the necessary



David Fairchild and Alex Hawkes in the former's garden, "The Kampong," on February 15, 1945.

introductions for anyone who cared and even for some that did not. Those who approach plants in this fashion have rewards difficult to find elsewhere.

Few can duplicate the rich experience of David Fairchild, but anyone can make a beginning and many have. I see them using the Library of The New York Botanical Garden; I found them visiting the rock garden at Wisley; I met them in botanical gardens, arboreta and nurseries in Great Britain and on the continent. Their number will increase and one of the major objectives of a botanical garden is to help those who wish to become acquainted with plants, and to make them their friends.

INTRODUCTION GARDEN (from page 204)

fruit samples for chemical and industrial evaluation. Agencies in the Department of Agriculture receiving these plant materials are the Eastern Utilization Research and Development division of general chemical survey; the Southern Utilization Research and Development Division for oil and wax-bearing plant studies; and the Northern Utilization Research and Development Division for protein analysis.

Two types of plants for potential new crops now under investigation are *Dioscorea* species (tropical yams), which are a source of the drug known as cortisone, and *Rauwolfia serpentina,* which is the source of the tranquilizing drug known as reserpine. [Joseph Monachino, a member of the herbarium staff of The New York Botanical Garden, did considerable research on the botany, uses, and literature of *R. serpentina* for ECONOMIC BOTANY.—The Editor.]

Still existing in other parts of the world today are thousands of untried plant species which may benefit our own country or the whole of mankind. It will be an important function of plant centers, such as the U. S. Plant Introduction Station at Coconut Grove, to aid in the introduction, evaluation and dissemination of these plants.

The research program on *Hevea* was described by Dr. H. F. Loomis under the title, "South Florida Aids in the Tropical Rubber Program," in the May-June 1953 number of The Garden Journal; the research program on bamboos by W. H. Hodge under the title, "Bamboos—Their Economic Future in America," in the July-August 1957 number of The Garden Journal. The article by K. L. Baringer on "New Information About an Old Crop—Peanuts" in the January-February 1955 number related the investigations carried out by the Southern Utilization Research and Development Division, while the article by Hedwig Michel on "Florida's Fame" in the November-December 1957 number told the story of the improvement in mango varieties.—The Editor.

ON DEXTER HYBRIDS

A Dexter hybrid rhododendron, raised from cuttings obtained by Dr. John C. Wister, Director of The Arthur Hoyt Scott Horticultural Foundation, from a plant grown at The New York Botanical Garden as N.Y.B.G. 67, has been named 'Scintillation' by Paul D. Vossberg and is being introduced by him.

Because of this, the Editor believes readers of The Garden Journal will be interested in the following excerpts from Mr. Vossberg's article which appeared in the QUARTERLY BULLETIN of the American Rhododendron Society, January 15, 1958. Mr. Vossberg is Propagator of the Westbury Rose Nursery.

ON ONE OF OUR PERIODIC TRIPS to the Arnold Arboretum with the late Henry Hicks, we decided to see what was going on at Sandwich, Mas-

sachusetts. We received reports that Charles O. Dexter was going into the breeding of rhododendrons on a large scale.

We were informed that Paul Frost encouraged him in his work by arranging the purchase of a number of *R. fortunei* hybrid seedlings from the old Farquhar Nurseries nearby. Any of the Dexter rhododendrons having an original number of one to twenty happen to be one of these Farquhar plants and not a Dexter hybrid. Mr. Dexter spoke of Ernest Wilson giving him advice on hybridizing and aiding him in getting pollen from England. Pollen from *R. smirnowi, discolor, decorum, haematodes, griffithianum* and a few brilliant, complex named hybrids, including one called 'Pygmalion,' were applied to the collection of these *fortunei* hybrid seedlings.

At that time Mr. Dexter stressed the use of *griffithianum* so much that we lost interest in his plants for our area. Since *griffithianum* was considered more tender than *fortunei,* we thought that his seedlings would not stand up for us.

Some years later a collection was planted on a nearby estate which gave us a good chance to study them for bud and plant hardiness. The winter of 1933-34 was very hard on broad-leaved evergreens; great fluctuation of temperatures and 14°-20° F. below zero in the interior of Long Island. We were very much surprised to see most of this collection nearby come through with very few casualties. Three of them showed no killing of flower buds. Many of the acknowledged iron-clads had sparse flower trusses that year.

After this experience with the Dexter hybrids in our locality, we changed our opinion on their value and at the same time draw only one conclusion: that his pollen was incorrectly named or insects and wind possibly carried pollen from the hardy Anthony Waterer and Parson hybrids which were scattered throughout his plantings. He may have used this pollen from hardy plants and neglected to tell us. Some of his seedlings show traces and earmarks of 'Everestianum,' 'Henrietta Sargent,' 'Lady Armstrong,' and 'Mrs. C. S. Sargent.' To our knowledge there were only five collections of original seedlings on the eastern seaboard. The other collections were plants propagated from the best on the Dexter place at Sandwich, Massachusetts. This may create some confusion at a later date when selections are made for naming.

About five years ago a committee was formed to examine these collections with the idea of selecting the most outstanding plants for propagation. To have passed final judgment on a seedling in any of these collections would have been a grave mistake. In many cases these hybrids were growing under adverse conditions, showing a spindly plant with a lovely truss of flowers. Then, again, a seedling may mature into a lovely plant, whereas the plant grown from this clone by vegetative propagation may turn out to be a big disappointment. For this and many other reasons we decided to grow these selections under average nursery conditions. If they produce blooming plants with good habits, acceptable to the public in three to four years, they may be considered worth naming and disseminating.

The term "Dexter hybrids" has been questioned by many. Personally, the writer considers most of these *fortunei* hybrids. Not to discredit Mr. Dexter's intensive work, most of the rhododendron growers are going along with the Dexter Classification at present. In time this may crystallize into a dozen or so named varieties credited to Charles O. Dexter. Parentage: unknown because records were rather vague on most of his seedlings. For show purposes and classification the best varieties may be grouped into *fortunei* and *smirnowi* hybrids. Here at Westbury (New York) we have about one hundred of the best selected from twelve collections along the eastern seaboard.

...after forty years of association with named hybrids, we still cannot pin down the answer to this [bud hardiness] . . .

The Dexter hybrids also show strange traits on bud hardiness. We assumed that plants doing well at Sandwich, Massachusetts, would also bloom profusely on Long Island, but this was not the case. Cape Cod Bay and the Atlantic Ocean, with numerous small lakes nearby, must create a moderating influence on temperatures and minimize daily temperature fluctuation. In the final analysis there may be only about a dozen outstanding varieties with an "A" rating for hardiness. The remaining may come under "B" and "C" rating. Most of the best selections run in the pink shades with flower trusses six to seven inches high and the same distance across; twelve to sixteen flowers to a truss and individual flowers measuring from three and a half to four inches across. Some of the creamy pink varieties have a delightful fragrance. The true red shades are rather scarce. The best reds can be found in the Swarthmore collection, with a few at the Morris Arboretum in Philadelphia. The cream-colored varieties seem to have a brownish yellow cast to the foliage. The best one in this class as far as foliage is concerned is one tabulated N.Y.B.G.-A, located at The New York Botanical Garden. As with most *fortunei* and *fortunei* hybrids, the new growth obscuring the blooms may be objectionable to some. This seems to be more noticeable on young vigorous plants. On the Ben Mosely estate at Ipswich, Massachusetts, where one may see mature plants some twelve feet high, the flower trusses are so plentiful that the slight new growth protruding does not hurt the general effect. At Halesite, Long Island, there was a crimson-red with a label 'Mrs. Henry B. Gardner' attached to it. The foliage is dissimilar from all other plants from Sandwich. This plant has been a consistent bloomer with us at Westbury. A large-flowering brilliant pink, purchased by the Coe Estate and named 'Mrs. Wm. R. Coe,' compares favorably with some of the glorified English hybrids found at Cornwall. A good white in this strain seems to be hopeless. Out of three on trial the best is a far cry from being favored by gardeners.

One of the Dexter hybrids proved such a grateful plant in habit, foliage, flower and hardiness that the writer named it 'Scintillation.' The satiny pink flowers remain longer in bloom than most varieties, and the foliage and plant habit make this a very desirable plant even when not in flower. We found very few purples; one (N.Y.B.G.-2-3), a purple at The New York Botanical Garden, should compete with our standard hardy purples for an early crop. A lavender at Ipswich could be termed a glorified 'Everestianum.'

(Continued on page 215)

WHY SHADE TREES DIE ALONG CITY STREETS

By **P. P. Pirone**

Dr. Pirone, Plant Pathologist of The New York Botanical Garden, gave the following talk at the thirty-fifth National Shade Tree Conference, Detroit, Michigan, August 1959.

SHADE TREES planted along city streets never die of old age. Nor do they live as long as their country cousins. The reasons for this are many and varied.

City trees live in an unnatural environment. Their roots are restricted by cement and asphalt pavements which greatly reduce the supply of available air and water. In many cities the open soil beneath a tree measures only about sixteen square feet. Through this limited area must pass most of the air, water, and plant food the tree will absorb during its lifetime.

Other unfavorable factors to which most city trees are exposed include a polluted atmosphere, extremely high reflected heat, and a low content of organic matter in the soil.[1]

Studies in progress since July 1956 have revealed that a number of other factors or agents cause the premature death of shade trees. The investigations involve a detailed study of three hundred and thirty dead or dying shade trees planted along streets in New York City and northern New Jersey. Most of these trees were in Queens and Kings (Brooklyn) counties of New York City. Others were in the boroughs of Richmond (Staten Island), Bronx and Manhattan. About forty were in or near Atlantic Highlands in northern New Jersey.

I examined every one of these trees on location at least once; some as many as three times. Some of the inspections took only a few moments. Others included the collecting of bark and sapwood specimens from the trunk, roots, or branches, and took as long as an hour.

Each tree was assigned a number, and records for each were kept. These included the kind and location of the tree and the date it was examined, its approximate age and DBH (diameter at breast height, or about four feet above ground), its condition on the day of the examination, and the condition of other trees and vegetation in the immediate vicinity. If specimens had been collected for laboratory tests, the results of these tests were also recorded.

Most of the dead trees had died within the year. But some had been dead for at least two years. Diagnoses in these latter cases were difficult or impossible, and many had to be placed in the "cause undetermined" category, which is described later.

One of the surprising revelations was that the Norway maple *(Acer platanoides)* was the species most frequently found among the casualties. Of the three hundred and thirty trees studied, two hundred and seventy-five were Norway maples. In other words, 83.4 percent of the dead or dying trees, which ranged from two to thirty-six DBH, belonged to this species.

Fig. 1. Dr. Pirone examines the base of a dying Norway maple infected by the fungus *Ganoderma lucidum*, seen growing out of the trunk. The healthy branches which he holds, were taken from the uninfected side of the tree.

One reason for the preponderance of Norway maple victims may be that this species was planted more extensively than the others. Nevertheless, the present investigation suggests that this species is more subject to fungus parasites and other ailments than are other kinds of trees.

Table 1 summarizes the various agents associated with dead or dying Norway maples.

The several fungi listed in Table 1 were identified either by their fruiting bodies *(Ganoderma* and *Armillaria)* on the dead or dying trees or from laboratory cultures obtained by culturing pieces of diseased tissue *(Phytophthora* and *Verticillium)* collected from the tree on the previous day.* Some of the *Ganoderma* and *Armillaria* identifications were made from laboratory cultures derived from sapwood specimens of trees on which no fruiting bodies had yet developed.

Table 1. FUNGI ASSOCIATED with 275 DEAD OR DYING NORWAY MAPLES.

	Number of Trees	Percent
Ganoderma lucidum (or *sessile*)	62	22.5
Verticillium albo-atrum	35	12.7
Armillaria mellea	20	7.2
Sphaeropsis sp.	11	4.0
Phytophthora spp.	6	2.2
Penicillium sp.	6	2.2
Other fungi	58	21.1
Total	198	
OTHER AGENTS OR FACTORS		
Mechanical injuries	20	7.2
Chemical injuries	11	4.0
Poor drainage	3	1.1
Winter injury	2	.7
Fire	2	.7
Insects	2	.7
Cause undetermined	37	13.1
Total	77	

GANODERMAS MOST COMMON FUNGI

Among the fungi associated with dead or dying Norway maples, *Ganoderma lucidum* (figure 1) and occasionally a closely related species, *G. sessile,* were most common. Sixty-two of the two hundred and seventy-five

*Thanks are due Biruta Eimanis, formerly my research assistant, for making most of the tissue culture isolations.

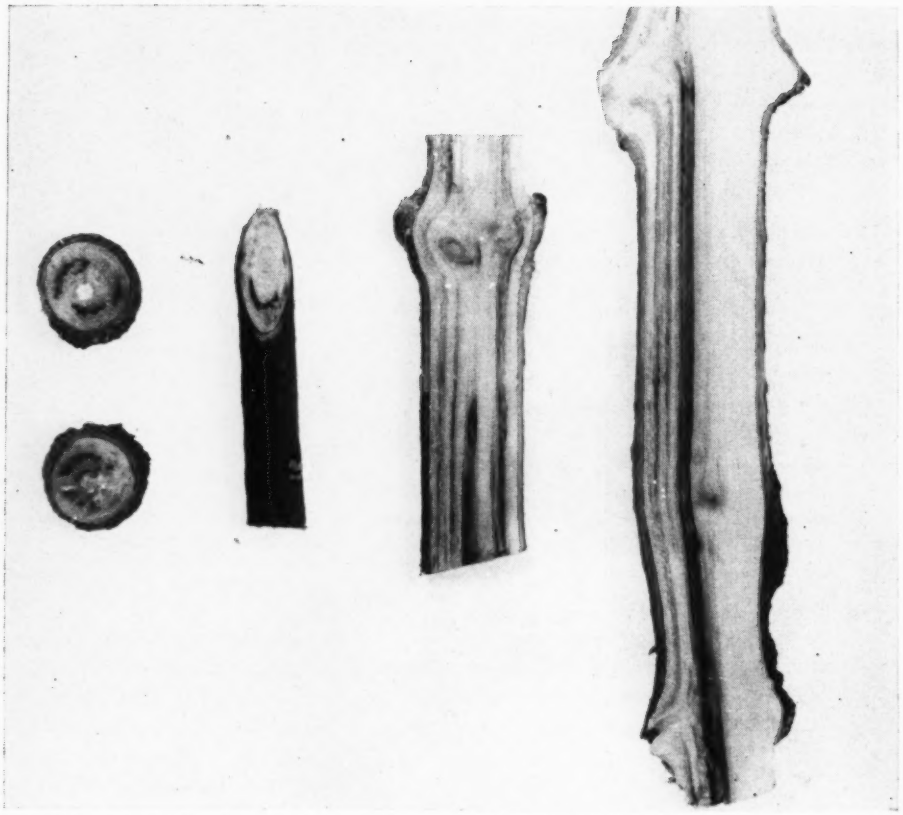


Fig. 2. Greenish coloration in the branches caused by *Verticillium albo-atrum* is rather rare. This symptom is more common in the roots and base of the trunk.

Norway maples, or 22.5 percent, harbored these fungi.

Because such an unusually high percentage of trees were involved, I decided to check on the pathogenicity of *Ganoderma*. Young Norway maples (three years old) were inoculated with pure cultures of *Ganoderma lucidum* grown on potato dextrose agar. The fresh fruiting bodies (conks) of the same fungus were chopped into small pieces and incorporated into the soil above the roots of other young Norway maples growing in pots.

Both practices resulted in infection and death of the inoculated trees, proving that the *Ganoderma* fungus is capable of parasitizing Norway maples. Details of these tests were published in the Bulletin of the Torrey Botanical Club.[2]

Verticillium albo-atrum was the next most common fungus, infecting 12.7 percent of the trees. All *Verticillium* determinations were based on laboratory isolation tests, because the mere presence of greenish discoloration in the sapwood was found to be an unreliable symptom. The tests revealed that six other fungi, when inoculated into young healthy trees, all produced the typical green discoloration. They were subsequently recovered at a point well away from the area where they were first inserted. The species involved have not yet been identified. These are included in the 21.1 percent of "other fungi" in Table 1.

In collecting samples from trees suspected of harboring the *Verticillium* fungus, I found that the trunk base was a more dependable source of the fungus than were the branches (figure 2). As a matter of fact, branch discolorations are rather rare, because most *Verticillium* infections start in the roots or the trunk base rather than through branch infections via air-borne spores. It was logical, therefore, to expect to find the effects of the fungus concentrated near points of entrance.

The shoestring root-rot fungus, *Armillaria mellea,* was the third most prevalent of the species identified. It was determined by the presence of black, shoestring-like strands of fungus tissue below ground, by the characteristic yellowish brown mushroom stage above ground, or by the white wefts of

Fig. 3. The bark of this Norway maple has been removed to expose the white wefts of the fungus *Armillaria mellea.*

Fig. 4. The fungus *Phytophthora cinnamomi* attacks the inner bark and sapwood of Norway maple.

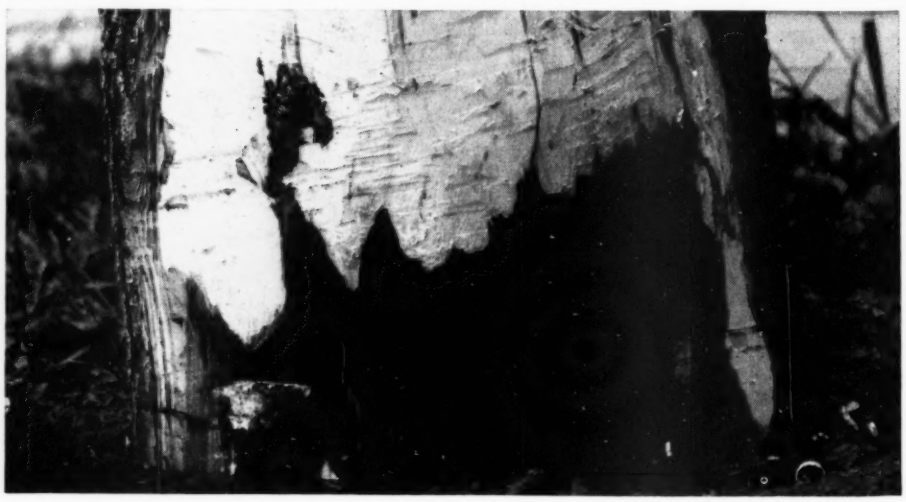


Fig. 5. Girdling roots occasionally strangle trees growing along city streets.

fungus tissue beneath the bark near the soil line (figure 3). As with *Ganoderma,* some determinations were also made by laboratory culturing of diseased inner bark or sapwood.

A few trees were found to harbor more than one parasitic fungus. For example, *Verticillium* and *Ganoderma,* or *Verticillium* and *Armillaria,* were sometimes isolated from the same tree.

Species of *Phytophthora* (figure 4), *Sphaeropsis,* and *Penicillium* were associated with a few of the diseased Norway maples.

In addition to the six unidentified species mentioned earlier as capable of causing discoloration in Norway maple sapwood, at least twenty other fungi were isolated. These are lumped under "other fungi" in Table 1. At least twelve of them caused infection and death when inoculated into healthy trees. I hope to report on the names of these organisms and their effects at a later date.

Fig. 6. Being hard hit by an automobile caused this severe injury to the bark.

Other Agents

Among the other causes of the premature death of Norway maples were so-called mechanical injuries, which comprised 7.2 percent of the total. Included in this group were girdling roots, damage by vehicles and malicious injury (figures 5, 6 and 7). I found several trees, for example, that had been girdled with an ax just below the level of the soil, which had then been replaced to conceal the girdled area.

Four percent of the trees were killed by chemical substances. Included in this category were turpentine, dry-cleaning fluids, crank-case oil, and improperly applied tree-banding materials used to trap cankerworm moths.

Poor drainage and winter injury accounted for very small percentages of the losses.

Thirty-seven trees, or 13.1 percent, died from unknown causes. As I mentioned earlier, because some of these trees had been dead for at least two years, diagnosis was impossible. But among the probable causes of death of some trees in this group were frequent visitations by male dogs and the use of rock salt. The former causes so-called "dog cankers" which kill the bark at the base of the tree. Placing a metal collar around the base of a tree is not enough to prevent such damage, because the toxic secretions enter the soil anyway and thus kill the roots. The soil around one tree (not included in the present study) frequently visited by male dogs was found to contain nine hundred parts per million of sol-

Fig. 7. An "excellent" paving job helped to contribute to the early demise of this Norway maple.

Fig. 8. Fires are a contributing factor in the premature death of some street trees.

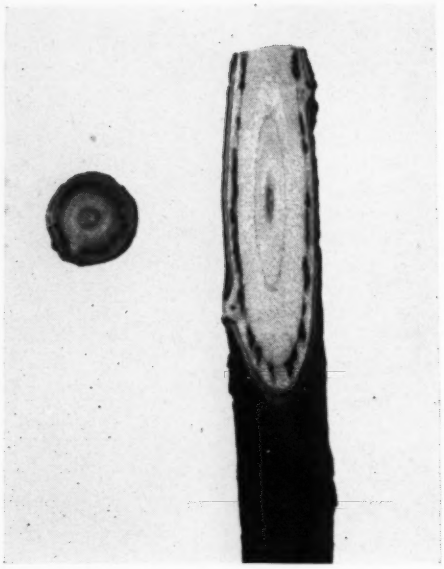


Fig. 9. The Dutch elm disease fungus *Ceratocystis ulmi* causes brownish discoloration of the sapwood.

uble salts—more than four times the maximum tolerance of some trees.

Rock salt applied by home owners or apartment house superintendents to melt snow or to prevent ice formation on sidewalks, or that applied along city streets to keep vehicles from skidding, also kills trees.[3] The salty water is frequently swept into the open soil area or is splashed into it by passing vehicles.

I have observed, for instance, that injury to trees growing along the Grand Concourse in the Bronx is more severe on the west side of this street than on the east. The sidewalks on the west side are salted more frequently, because they are shaded from the afternoon sun in winter. The walks on the east side are bathed in winter sun and hence do not require so much salting.

Observations on Other Tree Species

Among other maple species included in this investigation were nine red *(A. rubrum)*, eight soft *(A. dasycarpum)*, six sugar *(A. saccharum)*, and one sycamore *(A. pseudoplatanus)*. These were afflicted by the same fungi and other agents that affected the Norway maples.

Of twelve London planes *(Platanus acerifolia)* studied, six were found to have died from the fungus *Ceratocystis fimbriata* f. *platani*. Three others were being or had been killed by the fungus *Botryosphaeria ribis*. In nearly every instance leaf-fires beneath the trees (figure 8) seemed to have been associated with the infections, as reported by me in Trees Magazine[4] six years ago. Injury of this type should decrease sharply in New York City, at least, because of the recent restrictions placed on burning of materials by the Department of Air Pollution Control.

Five of eight American elms studied died from Dutch elm disease caused by the fungus *Ceratocystis ulmi* (figure 9). This disease, by the way, is presently causing more havoc to American elms in the vicinity of New York City than in any of the twenty-six years during which I have worked with it.

Three pin oaks, two red oaks, two catalpas, two basswoods, one white birch, and one sweet cherry comprised the remaining trees studied. These died from a wide variety of causes, including fungus attack, mechanical injury, or excessively deep planting.

Nine of the fifty-five trees other than Norway maples died of unknown causes. As with some of the Norway maples, diagnoses were impossible because these trees had been dead for two or more years.

SELECTED REFERENCES

1. Wells, N. M., Street Trees in New York City. Eastern Shade Tree Conf. Proc. N. Y. Bot. Garden, Dec. 8 and 9, 1938. 82-85, N. Y. 1939.

2. Pirone, P. P., **Ganoderma lucidum.** A Parasite of Shade Trees. Bul. Torrey Bot. Club 84 (No. 6) 424-428. Dec. 1957.

3. French, D. W., Boulevard Trees are Damaged by Salt Applied to Streets. Minn. Farm and Home Sciences **16** (No. 2) 9, 22, 23. Feb. 1959.

4. Pirone, P. P., Fire as a Predisposing (Contributing) Factor in Canker Diseases of Street Trees. Trees Magazine. **13** (No. 6) 9, 10, 20. Sept.-Oct. 1958.

IMPRESSIONS ABROAD (from page 202)

my horticultural mecca. After all, for many years as a member of the Royal Horticultural Society I had learned something of England's flora. I was trained under famous English gardeners, but now I was to see for the first time what I had dreamed of for years. Yes, I saw the Chelsea Show, Wisley, Kew, Kensington Gardens, Hampton Court, Windsor Park, the famous John Waterer & Son Nurseries, Exbury, the home of the Rothschilds, and also Bodnant high in the Welch hills where three generations of Aberconways have collected and harmoniously blended plants into a veritable horticultural paradise. These and other places I visited would require an article each to render them justice. I am certain that some of my readers who have seen these gardens and others throughout the world will agree that if one wants to see horticulture at its best, England is the place to do so. While sipping a cup of tea at the Chelsea Show, in the company of a middle-aged couple who were amateur gardeners, I reasoned why the cottage gardens of England are so beautiful. The owners know their horticulture, they love their lupins and delphiniums and nemesias.

Wisley and Bodnant gave me a new perspective on plans for the botanical garden (now in progress) in Norfolk. At Wisley, which I understand is criticized by a few professionals as being "too mixed up", I saw a people's horticultural library of facts and fancies.

The last visit was to Ireland—how well it is described as the Emerald Isle. How can anyone who loves plants resist admiring its quaint gardens and the prolific growth which exists almost everywhere. We visited the southwest portion, and approaching Killarney from that direction, after staying over at Bantry Bay, is nothing short of breathtaking. May I quote in part how I described it in my diary of June 5th? "From Bantry Bay we wound our way through the Caha Mountains into Killarney—the remarkable feature of the topography is that it ever changes—from rugged terrain studded with mountain goats to lush valleys on which we looked down from elevations of over two thousand feet. Approaching Killarney from the south is a never to be forgotten sight—there we saw hedges of *Fuchsia magellanica* and wild rhododendron growing up everywhere with an undercover of ferns and foxgloves. One of the ferns looked like *Phyllitis scolopendrium*, the harts-tongue fern."

Perhaps the most fascinating observation of our trip was that unwittingly we had followed the trail of the early Romans as marked by the ruins of their castles and fortifications. Here again in Ireland, as in Rome, *Valerian officinalis* thrived—this time from the crevices of these ancient fortifications. It seemed to convey a fond message of "Bon voyage" and "Au revoir". I could not help but wonder, if the Roman mortar did not have something to do with this floral phenomena!

A Country Housewife's Garden

By **Gertrude B. Foster**

Mrs. Foster is Editor of
THE HERB GROWER MAGAZINE

THE FIRST FROST of September, which came rather early this year, found me actually looking forward to winter. Not that I didn't bid farewell, with regret, to the basils and the curly purple perilla, which always look their best the afternoon before a frosty night. I did feel the usual pangs of parting with the full beauty and fragrance of the herb garden in the warm, sunny hours before the chill of evening set in to warn of the morning's blackened leaves. In fact, I stayed out until the moon rose full and silvery. It showed no signs of damage from a Russian rocket's glancing blow.

But this year I had been able to bring in all the scented geraniums and rosemaries at their largest and most pungent, seedlings of basils, dill and savory started in August, and sprouting roots of ginger and turmeric recently sent from Hawaii for the new lean-to greenhouse.

Phil was quite as excited as I about potting up all the tender plants for the greenhouse. He urged me to bring in all the green I could because, in the early months of winter, it is hard to bring things along to such maturity. The leggy and ungainly annuals could be thrown out later when seedlings would take their place, but in November their sweet-leaved verdure would be most welcome.

The little sash house that will be our winter garden is the realization of a dream more than twenty years old. When we first met over a score of years ago, Phil was running a full-sized greenhouse. I remember a January night there when the moon shone brightly on a perfect white rose. The very smell of a greenhouse in winter has always meant romance to me since then.

My husband-to-be had moved the greenhouse frame from an old estate to his family's place in New Jersey. He had spent most of his spare hours one summer setting it up and putting all the glass in place. Then he filled it with flowers that were the joy of his mother, a long-time invalid. With no experience previously, he set the boiler and learned the trade of growing flowers under glass. Those were the depression years when people were thrilled to be able to buy a bouquet of nasturtiums or stock or salpiglossis in winter for twenty-five cents each. He paid for the coal and electricity with such small sales and provided his mother with a new interest in blooms brought fresh to her bedside every day.

When we were first married we lived for a few months in a little cottage that had once been the potting shed of a greenhouse. Then we were able to rent another house that had a lean-to sashhouse attached to the back of it. It, too, had been the potting shed of a large greenhouse, but all that remained of its former glory was the small area that had been turned into a cottage.

In that little greenhouse we grew thousands of herb seedlings. For five years we filled the glasshouse and the kitchen and every available shelf and closet with herbs, fresh and dried. Laurel Hill Herb Farm began there, and thousands of feet of rows of rosemary, sage, basil, thyme and tarragon were set out from it. One year we grew an acre of belladonna with seedlings started in the 6 x 30 foot sashhouse. That was during the war when the government was seeking data on medicinal herbs that could be grown in this country. From the field-grown plants we collected seeds that were shipped all over this country and abroad. Many varieties of herbs had never been offered as seed before in this country.

After five years we out-grew the house. We could have put up more shelves for dried herbs and seed packets, but there simply wasn't any room in which to put a baby. So we moved as many plants as we could to a larger house where we brought home our own off-spring, Christopher. Little did we know that he would help build our next greenhouse for us.

Part of the joy in this winter's garden under glass is having waited and worked for it. We are not so much concerned with quantity in production as we were in those early years. The plants we are protecting now are not popular enough to sell. Who would want a real mandrake about the house? Only a person with a long-time interest in herbs or one with a literary bent like Henry Beston. His wife is the only other person I know who has kept one of the magical and legendary plants for a number of years. They are not plants you can show off in summer because they are completely dormant then. In winter the leaves are far from beautiful, being rather like those of belladonna or even pokeweed. But the root which resembles an over-size carrot has a history of great human interest. It is the fertility charm of the Bible and the ancient anesthetic found in Egyptian tombs. I have never had one shriek when transferring it from one pot to another, but I know by heart the tale of horror connected with digging mandrake in olden days. A dog was chained to the plant to pull it up, while the wary digger kept a safe distance to avoid hearing the horrible sounds—said to drive men mad—made by the root when pulled up.

If we can keep the mandrake, the acanthus of lovely leaf that inspired the sculptors of Greek columns, and a healthy *Laurus nobilis*, now fifteen years old, we are growing herbs which cannot be found in every garden. When they flourish and we succeed in propagating them, we have something rare to share with those who love the historic and odd herbs.

The scented geraniums will provide the frame for fragrant tussie mussies, the little old-fashioned bouquets that carry a message in each of their flowers and herb leaves. With just a few blossoms of dentate lavender or *Lavandula multifida* and the contrasting sprigs of rosemary, curious lavender-cotton or gray santolina, a bit of thyme for courage, sage for long life, it is easy to make a little nosegay circled by a lace-paper doily for the bedside of a hospital patient. Out of season, such a bouquet means even more than one taken from the summer herb garden.

In one corner of the bench of the greenhouse is a miniature culinary herb garden in a round cheese box. It is the duplicate of one made up in July for a birthday gift for a famous lady. Our doctor and dear friend, who took care of Madame Wanda Landowska for many years, came to us one day asking

(Continued on page 215)

FERNS FROM SPORES

As told by **Anne Seaman**

To **Dorothy Ebel Hansell**

Anne Seaman, who is a propagator of outdoor plants in the Gardening Department, has been at The New York Botanical Garden since 1941. When previously assigned to The Conservatory, Miss Seaman had charge of the tropical fern house, so she has had good experience in growing ferns.

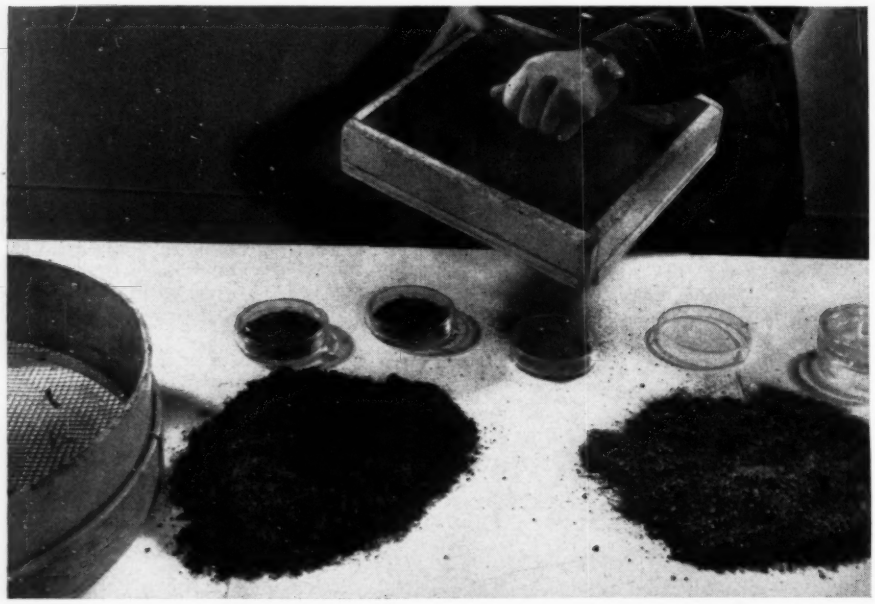
PETRI DISHES, fern spores, sterile transfer room, autoclave — these words were being bandied back and forth by Louis Politi, Horticulturist, and Dr. Richard Klein, Albert H. Caspary Curator in Plant Physiology, when interrupted by the Editor of THE GARDEN JOURNAL with "What's all this about? Sounds interesting."

"It is," replied Mr. Politi. "Dr. Klein is offering the facilities of the Research Laboratory to help the Gardening Department in germinating fern spores. This is typical of the way we do things here at the Garden. One staff member, or one department, is always ready to cooperate with another. Maybe you can develop a story for THE GARDEN JOURNAL."

"Would you two be willing to let Mr. Mitchell [the Garden's staff photographer] take pictures from the very start and at stated intervals? Then later on you can furnish me with information."

They agreed, and Mr. Mitchell took a number of pictures, from time to time, from which the accompanying illustrations were selected.

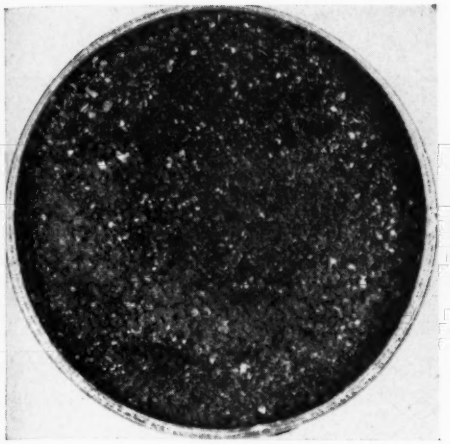
When the Editor asked for data, Mr. Politi said, "See Anne Seaman.



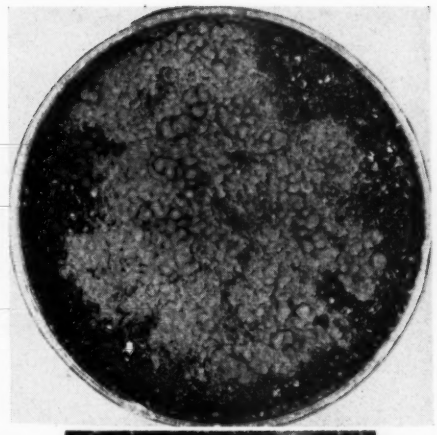
Anne Seaman screens soil over screened peat moss in Petri dishes.

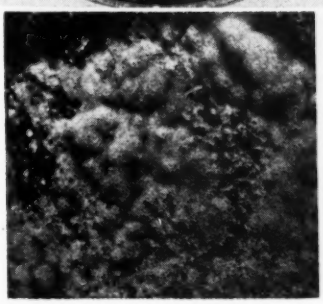
In the phytotron room of the Research Laboratory, Anne Seaman carefully inspects the Petri dishes for their state of moisture and germination.

Anne Seaman painstakingly sows fern spores under the sterile, no-movement-of-air condition in the "still" room of the Research Laboratory of The New York Botanical Garden.



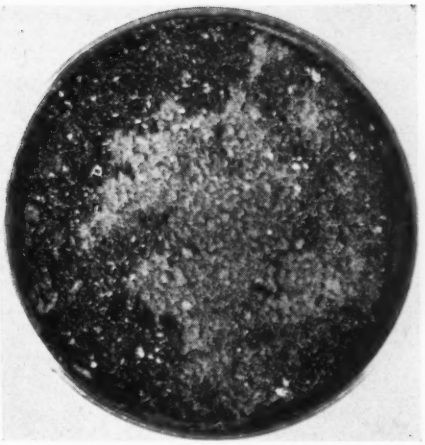
Spores of *Polystichum ensiformis* were sown in this Petri dish, filled with peat and soil, on December 2, 1958 and germinated on December 15, 1958.





Upper. Peat and soil filled this Petri dish in which spores of *Polystichum cretica* were sown on December 2, 1958, with germination noted on December 12, 1958.

Lower. Close-up of prothalli of *Polystichum cretica*



Only soil was used in this Petri dish in which spores of *Polystichum cretica* were sown on December 2, 1958, with germination noted on December 12, 1958.

She's the one who can tell you all you want to know. Anne has been responsible for this project."

So nine months after the sowing of the first batch of fern spores, when sufficient time had elapsed to learn what kind of report could be made, Anne Seaman said to the Editor, "I'm ready. Where do I begin? Ask a few questions to get me started."

"How many different kinds of ferns and from what source did the Garden obtain the spores?"

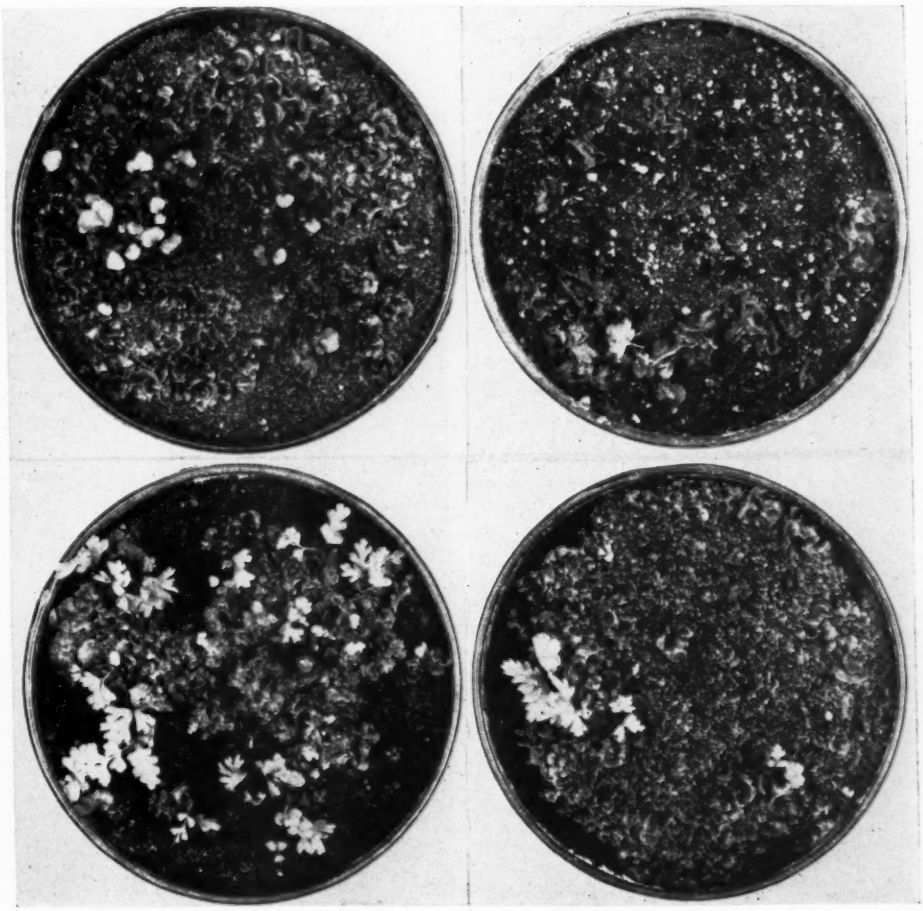
"We got the spores from botanic gardens in various parts of the world," she replied, "through the Garden's extensive seed exchange. There are one hundred and forty-two different species and varieties, mostly tropical—the kinds that have to be grown in the greenhouse. There were also spores of some hardy ferns."

"Now suppose you tell me how you handled the spores. Perhaps if you look at the pictures taken by Mr. Mitchell, starting December 2, 1958, it will refresh your memory and help you."

"I made the first sowing on November 26, 1958, and others on December 2nd of that year. It's a slow and painstaking job, as the spores are so tiny. Also they may hang in the air when being sown and in that way get mixed. That's why the sterile transfer room in the Research Laboratory is so practical. There is no movement of air in it, and it is sterile—both important factors when handling fern spores."

"But before you could sow the spores, you had to have a germinating medium. What did you use?" again queried the Editor.

"I screened soil, and I screened peat moss; then filled one half the Petri dishes with screened soil, and the rest

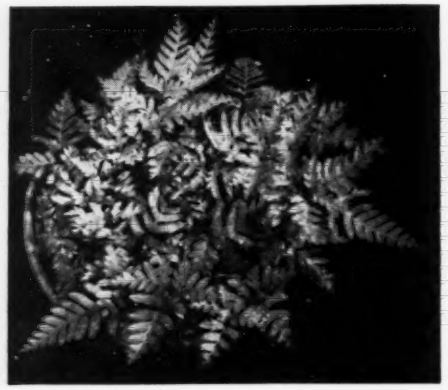


Top row, left, prothalli and developing plants of *Dryopteris pedata*; right, prothalli and developing plants of *Tectoria cicutaria*.

Bottom row, left, prothalli and developing plants of *Polypodium corronicus*; right, prothalli and developing plants of *Polypodium punctatum*.

And here are several beautiful ferns raised from spores at The New York Botanical Garden: —

Adiantum pedatum



Pteris serrulata rivertoniana

Diplazium polypoidiodes

with screened peat moss on the bottom and screened soil over it. These Petri dishes were given to Dr. Klein who sterilized them in the autoclave at a temperature of 250° F. for forty minutes or so.

"The spores come in small paper envelopes. I slipped a very narrow spatula into an envelope, picked up a few spores on the spatula, and then by tapping it gently scattered the spores over the medium in the Petri dish. I've already told you how important it is to have no air circulation during this operation.

"The Petri dishes were then stored in the phytotron room of the Research Laboratory. In this room temperature, humidity, light quantity, light quality and light duration are controlled, so the spores were under optimum conditions.

"The spores must be kept moist, but never soggy; the covers on the Petri dishes help to maintain an even moisture. It was necessary for me to inspect the dishes twice weekly, to see that they were moist and to watch for signs of germination. You know, of course, that the prothallus appear before the fern plant itself.

"For the benefit of those readers of THE GARDEN JOURNAL who may not be familiar with the term, perhaps I should explain that the prothallus is a tiny, flattened body, frequently heart-shaped, and a translucent green. It has hair-like roots and bears both reproductive organs on its under-surface. From these reproductive organs develops a germ-cell which grows into the fern plant. Some of the pictures taken by Mr. Mitchell illustrate both prothalli and developing fern plants well.

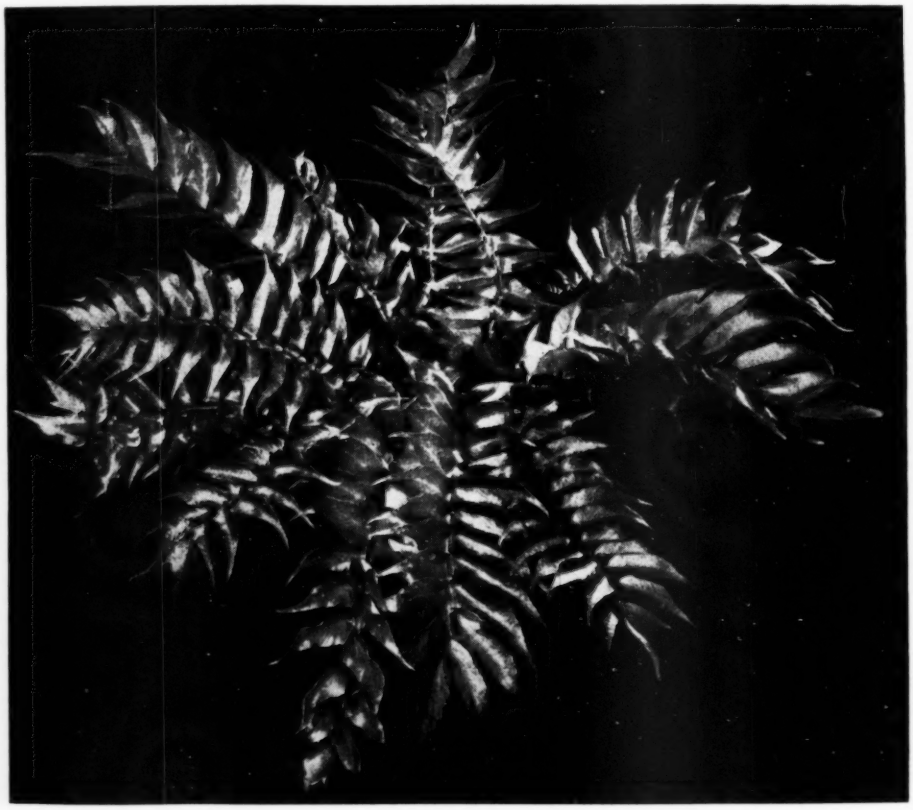
"When two Petri dishes of any one species showed germination—in other words, when the prothalli had appeared —one dish was moved to the Propagating Range, the other kept in the Laboratory. This was primarily a matter of space, but we also wanted to observe whether there would be any difference in results due to the varying conditions in the 'Prop' and the 'Lab'. We found no noticeable difference—they did equally well in both places."

"What about the rate of germination? Did some spores germinate more rapidly than others?" prodded the Editor, as Miss Seaman paused to catch her breath.

"The rate of germination varied considerably. The spores of *Polystichum cretica* were the fastest, germinating in ten days; those of *P. ensiformis* were next, germinating in thirteen days. Others took longer, even up to four months, notably the staghorn ferns.

"I pricked off *Polystichum cretica* on April 30, 1959; *P. ensiformis* on May 26th into small pots of light woodsy soil. The pots were placed in Wardian cases in one of the houses of the 'Prop'.

Cyrtomium falcatum



Above, prothalli and developing plants of *Tectaria heracleifolia*.

Right, *Tectaria heracleifolia* raised from spores.

As soon as the tiny plants took hold, the pots were removed from the Wardian cases and placed on a bench in a warm house.

"The care up to this point is the same in raising hardy ferns from spores as it is for tropical ones. But as the little plants become established, the hardy kinds are hardened off under cool conditions and will eventually be planted out, whereas the tropical kinds, when large enough, will be moved to and grown in the tropical fern house of the Conservatory.

"Any more questions?" asked Anne Seaman.

"Can't think of any. But, wait a minute—there's the problem of mold. I recall this was, indeed, quite a serious problem several years ago when a large-scale operation on fern spores was attempted in the old 'Lab' in the basement of this [Museum and Administration] building."

"You're right. We did get mold—*Penicillium*, in fact. And while it has saved many a human life, it killed the fern spores. This year we noticed some mold, considerably less under the more sterile treatment. By applying 'Semesan' most of the mold was killed or held in check.

"Dr. Klein, you may be interested to learn, tried sterilizing some of the fern spores in a solution of one gram of calcium hypochlorite and one hundred centimeters of water—one batch for ten minutes, another for thirty minutes. They germinated well but at a slower rate."

"And now, Anne, for my last question—is this a good way to build up a collection of exotic ferns?"

"If one can't afford to fare forth to the far corners of the earth to collect specimens, this is the best way, and certainly it is much more fascinating and rewarding to raise ferns from spores than to buy mature plants."

HOUSEWIFE'S GARDEN (from page 211)

for suggestions for a gift suitable for the great musician's eightieth birthday. He knew that she enjoyed gourmet meals, made more entrancing with herbs by her faithful companions, to overcome the limitations of a salt-free diet. So he wanted to give her a little herb garden that could be presented out of hand.

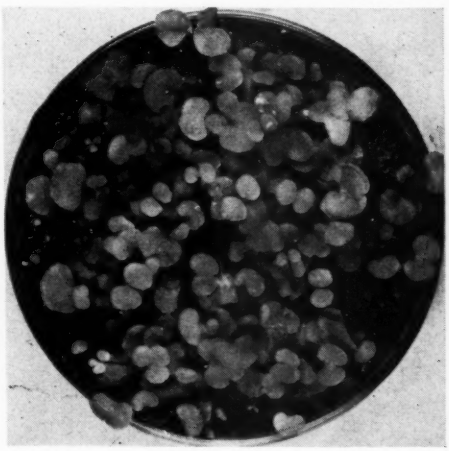
We found a round wooden cheese box about two and a half feet in diameter and stained the out-side with maple stain. Then we planted it with French tarragon, chives, bush basil and lemon basil, thyme, sage, parsley and winter savory. Each little plant was labeled.

Though that garden was enjoyed only a matter of weeks before Madame Landowska died, we will grow its duplicate this winter and think of the hot day when the doctor stopped in to pick it up. He was dressed in a freshly pressed summer suit and refused any help in carrying off the still-dripping box that was heavy with earth. We learned later that he carried it up the long drive to her house and presented it to her on the terrace, where she sat in state surrounded by friends and admirers from many lands.

One of the chief delights in being able to keep rosemaries in full leaf and pungent verdancy all winter is that of being able to carry a bushy, two-foot tall plant upstairs to become a table Christmas tree. Some years the rosemary is hung with tiny balls of glitter, and others, I make tiny cookies to suspend from strings and paper chains and spirals to drape across its fir-like branches. There are many legends associating rosemary herb with Mary the Mother of Jesus, and its flowers were supposed to have turned from white to blue when the Holy Mother spread her robe over a bush of *Rosmarinus* on the flight into Egypt.

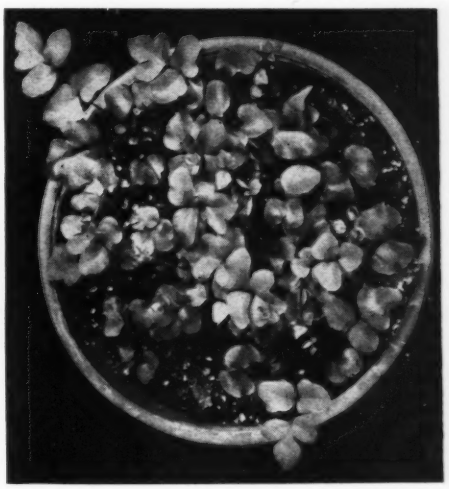
Below, *Aneimia villosa* in a Petri dish from spores.

Right, *Aneimia villosa* pricked off into a flower pot.



ON DEXTER HYBRIDS (from page 206)

Since our winters vary a great deal, it may take another two years to gather comprehensive reports from all who have had experience with these Dexter hybrids. At present the propagated clones of the best selected are being tested in various parts of our northeastern states.



A GROVE IN BEERSHEBA

By Philip Gillon

Mr. Gillon, an Israeli journalist, prepared this story for the Israel Office of Information in New York City.

"AND ABRAHAM planted a grove in Beersheba, and called on the name of the Lord, the everlasting God."

With these simple but compelling words Genesis describes one of the most important acts of the greatest of the patriarchs—the planting of trees in an arid zone. In Biblical times the destruction of trees was considered an offense comparable to the poisoning of wells. But in the generations that followed, the Holy Land suffered in wars that wiped out its vegetation and ravaged its soil by erosion. Without trees to protect it, the precious topsoil washed away in the gulleys and valleys.

When Herman Melville, the great American writer, visited Jerusalem a century ago, he commented on the mountains of Judea: "Before you and behind you are stones. Stones to right and stones to left . . . the removal of one stone only serves to reveal a second there, still larger, below it . . ."

What would Melville say if he could see the same hills today? Their skeletal slopes are covered by millions of slim columns of pine and eucalyptus: the stones he saw were there, all right, and so were the others below them, but they were moved by the energy of men determined to restore the fertility of the land.

Terraces and trees have worked a magical transformation in the mountains of Galilee and Judea—and in the arid zone of the Negev. Throughout Israel roads are lined with four rows of eucalyptus. The slopes of gullies and ravines are guarded against the erosion of the winter "flash floods". Trees serve as windbreaks against dust-storms.

Even before the State of Israel was proclaimed, the Jewish National Fund and the Mandatory Government had begun widespread afforestation. Today there are half a million dunams (a dunam is a quarter of an acre) of natural woodland and plantations in the country: in addition, five hundred miles of road have been converted into avenues of eucalyptus. In fact, so many trees have been planted that there are critics who suggest that some of the land put under plantations could have been used otherwise. One tourist traveling in a luxury bus and listening to a guide's description of the wonders behind the rows of eucalyptus even quipped that he could not see the wood for the trees.

Actually, Israel is at last doing precisely that—seeing the wood from the trees. The earliest-planted forests have reached a stage where logging operations are possible, where they are yielding lumber for stakes and other agricultural purposes, with the use of local trees for pulp, boxes, building and furniture possible in the not too distant future.

Anxious to make the best of its forests, the young country has turned for expert guidance to the United States. Late last year Roswell D. Carpenter, from Burlington Flats, New York, came to Israel under the International Cooperation Administration program as forest utilization adviser.

Roswell Carpenter graduated from the State University of New York's College of Forestry with a Bachelor of Science degree in 1931. A year later he obtained his Master's degree. Since then he has held a number of varied posts connected with lumber. He was superintendent of a Massachusetts CCC Camp; ranger and staff assistant in the United States Forest Service; research director; logging superintendent; research forester; forest economist; forest production technician; consultant; general superintendent; dry kiln expert. He has written numerous articles and has lectured throughout the United States in his field; he is a member of the Society of American Foresters and

A poplar grove in the Sharon Valley.

A cactus garden at Haifa.

Forest Products Research Society.

With such a record Roswell Carpenter is obviously eminently suited to channel Israel forester's thinking in the all-important early stages of their logging operations. They have responded eagerly to the counsel of the big but soft-spoken American.

Of the criticism that trees were planted too enthusiastically and that some of the forest land might have been used for agriculture, Carpenter shakes his head slowly and says: "You have to see the question of afforestation in the round. You can't just isolate an area and say that this could have been used in some other way. You must consider all the aspects—rainfall, erosion, vegetation, the country's economy. It seems to me that the Israelis have done a mighty fine job."

Within the few months that he has been in Israel the energetic American lumberman has already initiated a comprehensive program. With his guidance the Israel foresters are preparing a forest management plan for one of the older forests which will cover logging and utilization plans for the species and types of material due to become available for use at the time of the harvest cuttings. This will serve as a model for future plans.

He amazed the Israelis by showing that equipment did not need to be new and expensive. From a second-hand "scrap" cylinder (two yards long) he created a drum-type peeler for eucalyptus trunks. The machine can peel forty trunks of various diameters in nine minutes and can turn them into stakes for fencing and props for vineyards and tomato fields. Despite the apparent simplicity and the cheapness of the machine (it only costs one thousand dollars to assemble) it replaces machines operated by some four men and is also less prone to cause injury or accident. It operates on the principles of "knocking". The cylinder is turned by an engine and thereby the barks on the trunks, knocking against each other, are peeled cleanly and completely. Three or four machines, now in the course of construction, will supply Israel's full consumption of stakes and props, estimated at a million a year.

To elucidate the best methods of using machines and labor for efficient manufacture, he planned a layout to be located near Haifa. This will be equipped with a "hot and cold bath" treating plant using penta-chlorophenol as a preservative. Suitable hand tools were ordered from the United States and a demonstration given on how to use them. He designed simple machinery and a yard layout for a small manufacturing plant engaged in making agricultural plant supports, telephone poles, fence posts and lumber from both eucalyptus and pine.

This extensive achievement is the result of three months' unobtrusive but untiring devotion on the part of the American expert. His final and perhaps his most onerous task, from the point of view of Israel, is to help in the planning of forest communities dependent in the future for their livelihood on forestry and the utilization of lumber. In the decade of its existence the State of Israel has more than doubled

"Gan Hoshlosha" in the Bed Shéan Valley—a new garden planted in recent years.

its population, taking almost a million immigrants, penniless refugees coming from over seventy different countries. Many of them are being settled in the mountain villages and will depend on forest plantations for their existence.

Thus a new cycle has been created in Israel's fight to bring civilization and life to the badlands. Trees to combat erosion are becoming forests providing lumber for agriculture and industry. The dedicated idealism of the men who are imitating Abraham's example is allied to the wisdom of Roswell Carpenter, his "know-how" accumulated in thirty years of American forestry turned to helping the Holy Land to recover from centuries of neglect.

WHAT IS CONSERVATION?

What is conservation? What does it mean to us? It is difficult to formulate a definition for the word "Conservation." To some it means prevention of destructive practices affecting natural resources. To others, it implies better use of products and doing away with waste. Conservation is the opposite of extravangance and wastefulness. It means the practical application of all that is implied in the philosophy of "live and let live." It is actually a way of living—it is good management of the resources which sustain us.

Conservationists are concerned about the depletion of our natural resources. Our ancestors, when they founded this great nation, deprived us of many blessings, such as rich topsoil, forests of pine, oak and cypress, wildflowers that have become rare, and many wild animals and birds. This was done through ignorance, rather than wrong intent. Today we are learning that conservation can preserve all the fine things in life, and even repair much of the damage done by man in the past.

Conservation is a big thing, and everywhere individuals or groups have a primary interest in some special phase of it. When more people are educated to the importance of all phases of conservation, the achievement will be greater and benefits will increase for all. Conservation is a fundamental part of the moral, social, economic and physical fibre of this nation and the world. It is essential to any future prospect of peace and plenty. The late Louis Bromfield said "Real wealth is primarily the natural resources of a nation —its forests, its minerals, its oils, its agricultural land, the health, the vigor, the working capacity and the ingenuity of its people."

Conservation should preserve all the fine things in life. Our heritage must be preserved for those who come after us. All natural resources and the historic places should be conserved. The soul of man must have inspiration, and food for the soul is derived from the beauties of nature. The natural resources we seek to conserve are the source of our strength. What I am, and what you are, were built on these resources. To conserve them is now the greatest challenge to mankind. We must safeguard and use wisely our remaining resources—the resources on which progress and liberty are built. There can be no free world without them.

Mrs. Charles Betsam—excerpts from her article in THE GARDEN PATH, official publication of the Ohio Association of Garden Clubs, Inc.

A STUDY OF THE QUINCE AND ITS FRUIT

By Arnold Lowenstein

I am a devoted subscriber to The Garden Journal. I am also an amateur botanist.

In walking around the grounds of The New York Botanical Garden, I have never noticed any quince trees—or any fruit trees, for that matter. I do not make this statement in a critical manner, but just to explain that not having seen any quinces there gave me the idea of writing this little article about them.

THE QUINCE is a fruit tree concerning which botanists differ as to whether it is entitled to rank as a distinct genus *(Cydonia)* or as a section of the genus *Pyrus* (family Rosaceae). The name *Cydonia oblonga* is to be preferred to *Pyrus Cydonia.* Bailey gives five varieties of *C. oblonga,* namely: *lusitianca, maliformis, pyriformis, marmorata,* and *pyramidalis.*

The quinces are much-branched shrubs or small trees with entire leaves, small stipules, large solitary white or pink flowers like those of the pear or apple, but with leafy calyx boxes and a many-celled ovary in each cell of which are numerous horizontal ovules. The fruits may be round and flattened or somewhat pear-shaped, with large leafy calyx persisting on the mature fruit.

The common quince is a native of Persia and Anatolia and perhaps also of Greece and the Crimea. By Franchet and Savatur, *C. oblonga* is given as a native of Japan, with the native name "Maroumerou." It is certain that the Greeks knew a common variety upon which they grafted scions of a better variety from Cydon in Crete, whence it was obtained and from which the later names have been derived.

The fragrance and astringency of the fruit of the quince are well known, and the seeds formerly were used medically for the sake of the mucilage they yield when soaked in water. It makes an excellent preserve, and is often used to give flavor and sharpness to stewed or baked apples.

The fruits of the quince are golden-yellow in color, and the flesh takes on a pink color when cooked, giving an attractive color to jellies and conserves. 'Orange' is the most commonly grown variety. 'Champion' is another of the more important varieties.

The quince is but little cultivated in Great Britain. In Scotland it seldom approaches maturity, unless favored by a wall.

The Japanese quince, formerly considered in the genus *Cydonia* but now placed in the genus *Chaenomeles,* has been widely used as an ornamental shrub, particularly because of the beauty of its flowers that appear on the stems in late winter and early spring months before the leaves open fully. Some of the small shrubs bear large green fragrant fruits that are quite inedible in the fresh state but have been used in making preserves.

The quince was formerly grown in home fruit gardens and commercial plantings in the northeastern United States but later became the least esteemed of all tree fruits for orchards in that area. The fruit is almost inedible in the uncooked state and other fruits are preferred in the fresh state for the diet. It thrives under the same systems of cultivation as do apple and pear trees, and does fairly well along fence rows where it may be given little care. The quince is susceptible to a bacterial disease called fire blight, which

is also a serious hazard to pear growers in the United States. In this disease the fruit remains clinging to the branches. Trees are subject to the same scale insects that attack apples and pears and should receive the same dormant spray treatment for control of these pests.

One method of growing quince trees is by cross pollination. In order to achieve good results the trees should be spaced not more than one hundred feet apart, especially in cold wet springs when insects are active.

Quince stocks are used on which to graft the pear to dwarf the tree and hasten early bearing. The 'Angers' normally imported from France is the most important stock used for dwarfing pears.

THE NEW YORK BOTANICAL GARDEN

BOARD OF MANAGERS

Officers

CHARLES B. HARDING, *President*
R. GORDON WASSON, *Treasurer*
FREDERICK S. MOSELEY, JR., *Vice-President*
MRS. HERMANN G. PLACE, *Vice-President*
HENRY DE LA MONTAGNE, *Secretary*

Elective Managers

(Class of 1960)	(Class of 1961)	(Class of 1962)
ARTHUR M. ANDERSON	W. EARLE ANDREWS	MRS. JAMES COX BRADY
GEORGE CHAMPION	SHERMAN BALDWIN	LEONARD J. BUCK
HON. THOMAS C. DESMOND	HENRY F. DU PONT	MRS. CHARLES BURLINGHAM
DR. JOHN M. FOGG, JR.	WILLIAM E. HUTTON	GILBERT H. MONTAGUE
CHARLES B. HARDING	DR. L. O. KUNKEL	FREDERICK S. MOSELEY, JR.
MRS. JOHN E. LOCKWOOD	REV. LAURENCE J. MCGINLEY, S.J.	MRS. HERMANN G. PLACE
HENRY DE LA MONTAGNE	MRS. HAROLD I. PRATT	MRS. JOHN L. SENIOR
HENRY PARISH, II	MRS. DAVID ROCKEFELLER	CHAUNCEY STILLMAN
R. GORDON WASSON	DR. WILLIAM C. STEERE	OAKLEIGH L. THORNE
	JOSEPH R. SWAN	

Ex-Officio Managers

ROBERT F. WAGNER, *Mayor of the City of New York*
CHARLES H. SILVER, *President of the Board of Education*
ROBERT MOSES, *Park Commissioner*

Appointive Managers

By the Torrey Botanical Club: DR. LELA V. BARTON
By Columbia University: DRS. FRANK J. POKORNY, CHARLES GLEN KING, MARSHALL KAY, EDWIN B. MATZKE

THE STAFF

WILLIAM C. STEERE, PH.D., D.ES-SCI.	*Director*
ROBERT F. KOLKEBECK, M.B.A.	*Assistant Director (Administration) and Business Manager*
AUGUST C. PFANDER	*Administrator*
H. W. RICKETT, PH.D.	*Acting Assistant Director (Botany) and Bibliographer*
BASSETT MAGUIRE, PH.D.	*Head Curator and Coordinator of Tropical Research*
ARTHUR CRONQUIST, PH.D.	*Curator*
THOMAS H. EVERETT, N.D.HORT., M.S.	*Assistant Director (Horticulture) and Curator of Education*
RICHARD M. KLEIN, PH.D.	*Alfred H. Caspary Curator*
P. P. PIRONE, PH.D.	*Plant Pathologist*
DAVID J. ROGERS, PH.D.	*Curator of Economic Botany*
CLARK T. ROGERSON, PH.D.	*Curator of Cryptogamic Botany*
E. J. ALEXANDER, B.S.	*Associate Curator*
JOHN J. WURDACK, PH.D.	*Associate Curator*
MARJORIE ANCHEL, PH.D.	*Research Associate*
ALMA BARKSDALE, PH.D.	*Research Associate*
ANNETTE HERVEY, PH.D.	*Research Associate*
STEPHEN S. TILLETT, B.S., M.S.	*Research Associate*
MRS. MARY FLEMING	*Technical Assistant*
CAROLINE K. ALLEN, PH.D.	*Visiting Research Associate*
HERMAN F. BECKER, PH.D.	*Visiting Research Associate*
ELIZABETH C. HALL, A.B., B.S.	*Librarian*
DOROTHY EBEL HANSELL	*Editor of The Garden Journal*
HOWARD W. SWIFT	*Assistant Curator of Education*
FRANK C. MACKEEVER, B.S.	*Custodian of the Herbarium*
JOSEPH MONACHINO, B.S.	*Associate Custodian of the Herbarium*
VINCENT RAMPINO	*Superintendent of Buildings and Grounds*
LOUIS P. POLITI	*Horticulturist*
ELMER N. MITCHELL	*Photographer*
WILLIAM J. ROBBINS, PH.D., SC.D.	*Director Emeritus*
HENRY DE LA MONTAGNE	*Assistant Director Emeritus*
H. A. GLEASON, PH.D.	*Head Curator Emeritus*
BERNARD O. DODGE, PH.D.	*Plant Pathologist Emeritus*
FRED J. SEAVER, PH.D., SC.D.	*Curator Emeritus*
RUPERT C. BARNEBY, B.A.	*Honorary Curator of Western American Botany*
JOSEPH F. BURKE	*Honorary Curator of the Diatomaceae*
EDMUND H. FULLING, PH.D.	*Honorary Curator*
INEZ M. HARING, B.L., M.A.	*Honorary Curator of Mosses*
ETHEL ANSON S. PECKHAM	*Honorary Curator of the Iris and Narcissus Collections*
OTTO DEGENER, M.S., SC.D.	*Collaborator in Hawaiian Botany*
MRS. WILLIAM PHELPS, JR.	*Collaborator in Venezuelan Botany*

BOOK REVIEWS

FRUITS FOR SOUTHERN FLORIDA, David Sturrock. 186 pages, illustrated, indexed. Southeastern Printing Co., Stuart, Florida. 1959. $4.00

My father went down to Dade County, Florida, from Tennessee in 1910. He bought a ten-acre grove, and since it had been established for some years a number of unusual tropical fruits were growing there. I well remember the look of distaste on my mother's face when she first tried the avocadoes that dad sent up to us. She called them "alligator pears" and declared that they tasted like soap.

Reading David Sturrock's very interesting book makes me realize how much experimenting and pioneering have gone into the introduction of hundreds of varieties of tropical fruits since 1910. Many of them are common now, and we couldn't get along without them.

This handbook is fine for anyone who is interested in growing tropical fruits for it gives their culture, their uses and their dietary values. It is well illustrated with black and white line drawings. The maps are useful and there is a very good chart on the uses of the fruits, beginning with avocado and going through the white sapote —with such exotic fruits as carambola, sapodilla, surinam-cherry and tamarind intriguing one's interest in between.

I always remember David Fairchild's enthusiasm for new fruits. When we would ask him how to use it, he would say, "it makes fine jelly"! Many of the fruits noted do make fine jelly, among them the antidesma which resembles grape jelly. It grows into a huge tree and is beautiful when covered with masses of red berries turning black when ripe.

ELEANOR F. JENNINGS
West Orange, New Jersey

SMALL FRUITS FOR YOUR HOME GARDEN, Harold J. Clarke. 372 pages, illustrated, indexed. Doubleday & Co., Garden City, New York. 1958. $4.95

An excellent book, written primarily for the home gardener who wishes to produce some fruit for his own consumption. Also of equal value to the person who intends embarking on a more extended production or even the commercial field.

Chapter one discusses the whys and wherefores for growing small fruits and among others comes up with the indisputable freshness, good flavor and increased food value of the garden fresh product. The increasing trend toward home freezing of foodstuffs also adds much toward the desirability of home-grown fruits.

Detailed instruction as to the choice of kinds of fruits for the different climatic conditions over this country, suitable varieties for certain areas and the proper sites for satisfactory production are given, together with cultural information as to soil preparation, planting, pruning, feeding, pest and insect control, and harvesting.

Special requirements for the various kinds of fruits form a large part of this volume and a wealth of information, helpful to the grower, is contained therein. Much is written of an interesting character such as the recent rise in popularity of the blueberry as a garden plant; how it came about and the amount of scientific research that entered into it. A chapter on plant breeding undoubtedly will prove interesting to many readers, particularly those who have a yen to produce something "new". It also gives

an insight into the scientific methods used by the serious plant breeder.

Apart from the technical and scientific instruction in Dr. Clarke's book, there also is quite a lot of incidental information that makes for good reading. This can come only from an author who has gained his knowledge from actual experience. Dr. Clarke, who has spent the greater part of his life in scientific and practical horticulture, has produced a good work.

Illustrations are many and informative, and there is an excellent index.

EDWIN BECKETT
Stockbridge, Mass.

GARDENING FOR GOURMETS, Ruth A. Matson. 262 pages, illustrated, indexed. Doubleday & Co., Garden City, New York. 1959. $3.95

Here is a book for those who not only like to garden but to cook—and eat. Most vegetables are best when picked at a particular moment of maturity and popped right into the pot or salad bowl. Naturally, for this kind of ultimate eating, a garden must be right at hand. The author gives us a pleasant and informal but detailed guide for setting up such a garden on a small scale, yielding enough for one family. She concentrates not on bumper crops or growing for preservation and canning, but for providing through the growing season vegetables and some fruits for those whose tastes are developed to the point where a few hours' delay between picking and eating makes a great difference—and in more than just corn and asparagus.

In a kind of diary through the season information is provided on the author's experience with arrangement of garden space, timetables of planting and harvesting, tools, soils and pests. There are special chapters on inexpensive plastic film coldframes, on garlic, herbs, fruits, and artificial-light gardening in winter. Finally, fifty-five simple recipes are given which, though not extremely exotic, are enough out-of-the-ordinary to be definitely worth trying, such as the following:

Red Cabbage De Luxe. Slice thin one small red cabbage and a small onion; pare, quarter and core one apple. Cook these in one cup boiling water; season with one teaspoon salt and ¼ teaspoon pepper. Add one tablespoon butter and ½ cup dry red wine. Cover and cook briskly for thirty minutes. Add ¼ cup grape jelly and cook another ten minutes. If all the juice is not absorbed, thicken with a teaspoon or two of flour. Serves 4-6.

GEORGE EITEN

AROUND THE WORLD IN MY KITCHEN, Elaine T. Ferraresso. 108 pages, illustrated. The Berkshire Publishing Co., Cambridge, Mass. 1959. $1.50

As the title implies, this spiral-bound book presents one to three recipes each from forty-seven countries. The dishes are relatively simple to prepare and provide a slight change from everyday fare. As a contrast to the red cabbage recipe given above, here is a Danish version from this book:

Cut one large head of red cabbage into strips and toss in a frying pan in which ½ cup of butter has been melted. Coat cabbage evenly with the butter. Add ¼ cup vinegar, ½ cup water and one teaspoon caraway seeds. Cover and cook 1-½ hours (I think a shorter time would do). Add ½ cup brown sugar and cook fifteen minutes longer. Serves 6.

GEORGE EITEN

ENGLISH HOLLY
—for Christmas

The beautiful lustrous English holly grows to perfection only in the northwestern United States and England.

We have had nothing but the highest praise for the beauty and arrival condition of our holly, due to above average care in cultivation, selection, and packing. Mistletoe, juniper, and cedar included. Postpaid, special delivery.

Gift Box #1	30" x 7" x 3½"	$4.95
Gift Box #2	15" x 7" x 3½"	$2.50

Write for complete folder

OREGON SELECT HOLLY FARM
ROUTE 3 BOX 57B SHERWOOD, OREGON

GARDEN DESIGN, Sylvia Crowe. 229 pages, illustrated, indexed. British Book Centre, Inc., New York. 1958. $15.75

This is a book to be welcomed by both the amateur and the professional. Each section of History of Gardens, Principles of Design, Materials of Design, and Specialized Gardens is interestingly conceived, well written, and well illustrated.

Of the whole book, the part on Materials of Design seems most helpful. Many books on garden design are rather abstract and take too little account of the actual materials with which we must work. The chapter on Land Form is especially valuable, but rather too short to cover the importance of the subject, and of the author's knowledge.

Miss Crowe has done a genuine service in putting so much knowledge in a single volume.

MARY DEPUTY CATTELL
New York, New York

PERENNIALS IN THE GARDEN FOR LASTING BEAUTY by Charles H. Potter. 264 pages, illustrated, indexed. Criterion Books, Inc., New York. 1959. $6.95

In PERENNIALS IN THE GARDEN FOR LASTING BEAUTY, the author defines his use of the term as "hardy herbaceous perennials which tend to live year after year without replanting." It is, therefore, surprising to find in his list of one hundred and sixty-six genera and their "popular species"—largely run of the mill—cannas, heliotrope, asparagus fern, agapanthus, the greenhouse varieties of maidenhair fern, etc. If this plant list had been arranged either according to the zones of hardiness or into geographic areas, the book would have greater value.

While many plants, tender in cold regions, are perennial in southern gardens, it is also true that those perennials requiring a long dormant period do not do well where winters are warm. It is important for the "home gardener", to whom the book seems to be directed, to know *what* is perennial *where*.

Mr. Potter gives some good cultural advice, and some that is not so good, and some that is conflicting—as on soil analysis. He has obviously done his research on species, but there is little evaluation of them as desirable garden plants. *Ipomea pandurata*, the wild sweet potato, may be hardy but what a pest! Nor is there much information on new hybrids. Why, for example, would the home gardener give space to the species hemerocallis when there are hundreds of improved, beautiful new varieties?

The frequent references to plants that force well or are desirable greenhouse material are out of place in a book entitled PERENNIALS IN THE GARDEN.

DOROTHY OAKLEY SHELDON
Roxbury, Connecticut

MODERN ART IN FLOWER ARRANGEMENT, Emma Hodkinson Cyphers. 123 pages, illustrated, indexed. Hearthside Press, Inc., New York. 1959. $4.50

In this book, the flower arranger will find inspiration to shed the old traditional feeling for arrangements and acquire new feeling for design and expression. The writer knows her subject well. The terminology and approach to the subject of flower arrangement from the angle of modern art is both refreshing and inspiring.

The first part of the book covers a description of modern art and a survey of the modern movement. Contemporary and modern art periods are also discussed. The outline of comparison between traditional and modern art is excellent and invites further study. Mrs. Cyphers points out that the traditional period gives a feeling of security, because it is familiar, where the modern art period is unfamiliar.

The fine photographs are visual proof of the strong influence of modern art in the field of flower arrangement. The arrangements are bold in design. Simplicity is dominant. These arrangements challenge the flower arranger to attempt new ideas, using modern materials in new ways. They challenge the artist to experiment with the use of space.

This book offers advance study material for the experienced flower arranger. The novice should also profit from it. Using MODERN ART in FLOWER ARRANGEMENT as a guide should open up a new school in American modern flower arrangement.

VERA T. BAYLES
South Orange, New Jersey

DAFFODILS, OUTDOOR AND IN, Carey F. Quinn. 204 pages, illustrated, indexed. Hearthside Press, Inc., New York. 1959. $4.50

We welcome another book extolling the "dancing daffodils" which have taken their place among the favored flowers throughout America, and the author certainly evinces a thorough knowledge of the subject.

He gives valuable information on every phase of their culture, both in the garden and greenhouse. Breeding, evaluating new hybrids, shows, judging and judges are also discussed. A chapter of immense interest to garden makers is Daffodils in Garden Design, which gives a well-chosen list of varieties that may be planted with shrubs in the perennial bed as well as in the rock

(Continued on page 226)

NEWS, NOTES and COMMENTS

HONOR TO DR. STEERE

At an impressive convocation, held during the International Botanical Congress, the University of Montreal conferred honorary degrees upon William C. Steere, Director of The New York Botanical Garden; Cornelius G. G. J. van Steenis of The Netherlands, Editor of FLORA MALESIANA: Pierre Chouard, Head of the Department of Vegetable Physiology, University of Paris: Irenee Lussier, Rector of the University of Montreal; Eric Hulton, Director of the Stockholm Museum of Natural History; and Stanley A. Cain, Director of the Department of Conservation, University of Michigan.

In presenting Dr. Steere, Frére Lucien Lévesque, read the following:

"Monseigneur, the University of Montreal, in conferring today on Professor William C. Steere the title of Doctor, honors a scholar and investigator of world-wide reputation, a professor of great culture, an intrepid and indefatigable explorer, a skillful organizer who has been able to serve several scholarly institutions with his administrative ability, his sense of responsibility, and his comprehension of the problems of science and of universities as related to other problems of the American Nation. It is, then, a great pleasure for me to present to you this eminent man of science.

William Campbell Steere was born 4 November 1907 at Muskegon, on the shore of Lake Michigan, in that American Middle West which already counts so many illustrious persons in different realms of human activity. He studied at the University of Michigan at Ann Arbor, where he obtained his Master's degree in 1931 and his doctorate in 1932.

His professional career began in 1929 at Temple University in Philadelphia, where he was in charge of the course in biology until 1931, during a period as graduate student in the University of Pennsylvania. He then returned to his Alma Mater, the University of Michigan, where for the next twenty years he shared with students in botany the wide knowledge that he had acquired through his continual research and his several explorations throughout the two Americas. He was named Professor in 1946 and Head of the Department of Botany in the following year. In 1950 he became Professor of Biology at Stanford University, and in 1955 was called to the position of Dean of the Graduate School of the same University. He discharged these important duties until 1958, when the Managers of The New York Botanical Garden entrusted him with the direction of the Garden, the position that he fills at this time, together with that of Professor of Botany at Columbia University.

William Steere has taught continuously since 1929; his pupils are scattered over North America, in Canada as well as in the United States. His advice is sought in troublesome questions of bryology. He is the master consulted the more freely that all know that William Steere never spares himself when help is requested. His cooperation is not limited to questions of bryology, but extends to all the other cultural and scientific activities of his colleagues and friends. This quality, together with his innate sense for administration and organization, allows him to fulfill numerous directive functions. We may judge of this by the positions that he has held so far. From 1936 to 1940, he was editor of the publications of the Michigan Academy of Science, Arts and Letters; for sixteen years he was editor-in-chief of THE BRYOLOGIST, which under his direction acquired a high scientific standard; for five years he continued his connection with this serial as associate editor; for four years he was editor-in-chief of the AMERICAN JOURNAL OF BOTANY; for four years also, he was associate editor of ANNALES BRYOLOGICI; and in 1958 he was named editor of a section of BIOLOGICAL ABSTRACTS. I have already pointed out his important administrative functions at the University of Michigan and at Stanford University. It is not surprising, then, that he was chosen for the position of Director of a scientific and educational institution so important as The New York Botanical Garden. Those who know William Steere know that for him difficulties exist only to be overcome. He resolves with equal ease the problems of science and of administration.

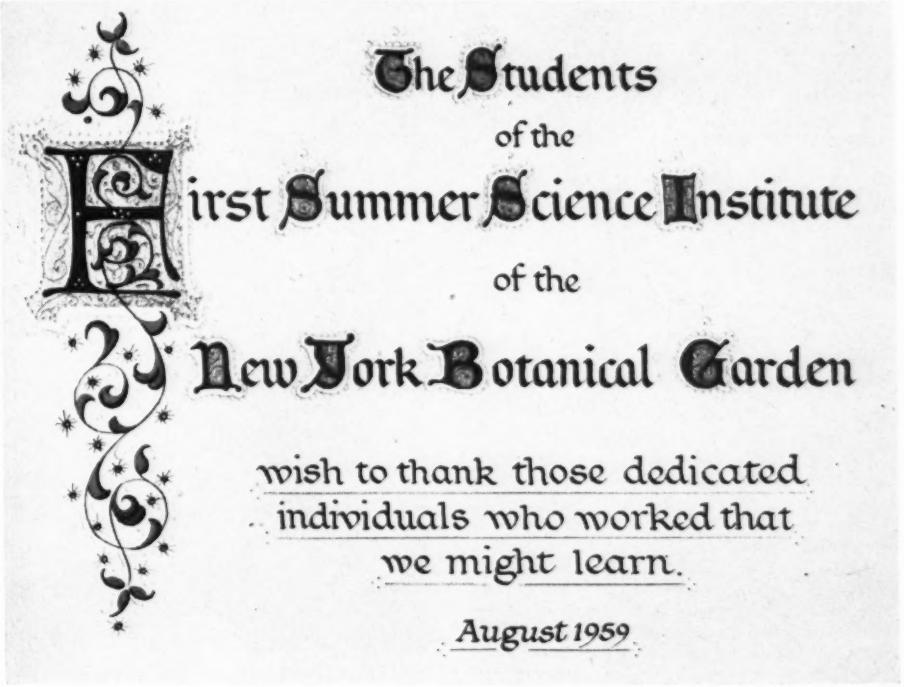
His career as scientific investigator began with his career as professor, and with the passing of the years has only intensified. More than one hundred and fifty publications, to date, attest this. His researches belong to the entire domain of bryology: cytology, morphology and anatomy, taxonomy, ecology. His numerous explorations throughout the two Americas and his field work in Scandinavia in 1954 have allowed him to study the bryologic flora of these regions. Thanks to the numerous studies that he has published in various reviews, the bryophytes of North and South America are now better known. As might be expected, he studied in detail the bryophytes of Michigan. He then extended his researches to the United States, to Canada, to Alaska, to Puerto Rico, to Haiti, to Colombia, to Ecuador, to Yucatan, and to various other regions that would take too long to enumerate. I should emphasize here his very valuable collaboration in the study of the bryophytes of the Canadian North, which forms an important chapter in the memoir entitled "Botany of the Canadian Arctic."

I could continue to speak for a long time of the very full career of this eminent man of science. But I must stop. I wished in these few lines to sketch the arduous and meritorious work of a scholar of whom the American Nation can be proud. I should add that the remarkable work accomplished by Professor Steere has been facilitated by the loyal, courageous, and sustained collaboration of a charming wife. Mrs. Dorothy Osborne Steere has accompanied her husband in several of his trying explorations in Europe, in the Antilles, and in the Canadian North, preparing the specimens collected and keeping the records in good order. I should add that her encouragement has helped her husband in difficult circumstances. It is indeed proper that her name should be associated with that of her companion; she has earned this.

Monseigneur, I am very happy that the University of Montreal may welcome into its great family, under the title of Doctor, on the occasion of the IX International Botanical Congress, William Campbell Steere, distinguished professor, outstanding administrator eminent scientist."

The Summer Science Institute at the Garden. Eighteen very fortunate high school students living in the New York City area were selected this spring to participate in a Summer Science Institute at The New York Botanical Garden, supported by the National Science Foundation. We eighteen students have just completed a very comprehensive, five-week course in general botany. I should like, now, to give a brief resume of the activities in which we participated. Through our lecture and laboratory experience, many new scopes of interest were opened to all of us.

The staff members of The New York Botanical Garden who instructed us in their respective fields are Dr. Rogers, who introduced the group to botany, discussed career opportunities in botany, and with whom we studied some plant taxonomy; Dr. Maguire who instructed us in the fields of plant



geography, ecology and taxonomy; Mr. Alexander who taught us methods in plant morphology, and with whom we studied the groups of ferns and their allies, monocots and dicots; Dr. Klein who explained to us the various aspects of plant physiology and related fields; Dr. Hervey who instructed us in general microbiological techniques with applied experiments; Dr. Rogerson who introduced us to mycology; Dr. Pirone who told us about plant pathology; and Mr. Everett who discussed with us both the history of, and today's modern realm of horticulture. In addition, several guest speakers introduced us to their areas of botany. We also took some field trips, to the pine barrens in New Jersey, to the Merck and Rutgers Laboratories, to the Julius Roehrs establishment, and the Gonzales estate in Westchester.

Through all these activities, we all have learned a great deal and enjoyed ourselves while we learned. Specifically, we all acquired a greater interest in botany, and some of us have become so interested that we have decided to go into botany as a career.

All of us have appreciated the fact that through the Summer Institute we have been able to make friendships with students of our own age who share similar interests in botany.

Besides learning many important scientific theories, facts and statistics through this course, we have also learned valuable scientific techniques, which, to some of us, will be useful in later life. To briefly list a few: in the field we have learned how to key out a plant by using Gleason's book, PLANTS OF THE VICINITY OF NEW YORK; how to recognize the vital organs of a plant, how to distinguish between a poisonous and a non-poisonous mushroom; and how to use a hand-lens. In the laboratory, we learned how to use the camera lucida and oil immersion lens on a microscope, the importance of absolutely sterile technique and accurate measurements when conducting experiments, and how to make agar.

Some of our instructors' philosophy towards science was also passed down to us; for example, we have been made to realize that expensive scientific equipment and machinery in a laboratory is not really an end in itself and should not be regarded as such, but merely as a means to an end, to the end of aiding scientists in accurately compiling data formed by experiments, so that logical conclusions may be reached. Also, libraries are very valuable in research, to the extent that they may be used to find how much is known about a particular subject. But, in any type of research, nothing can substitute for doing boring, menial and sometimes hard work to find out the answer to a problem.

In closing, we would like to thank all those dedicated individuals who gave so unselfishly of their time and talents in our behalf.

DOROTHEA BEDIGIAN

Gardencraft Graduation. On the morning of September 12, 1959, a special program for class members, their parents and friends was held in the Snuff Mill of The New York Botanical Garden.

Colored slides of the Gardencraft program during the past year were shown by Mrs. Lillian Weber, Instructor, and certificates were awarded to all Gardencrafters who completed a full season's work on their plots of vegetables and flowers and attained an average grade of 65 or better. It is interesting to note that several young Gardencrafters earned grades of 90 and better. The certificates were presented by Mrs. William C. Steere.

Fund for New Library. The appeal directed by Charles B. Harding, President of The New York Botanical Garden, and Mrs. Hermann G. Place, Chairman of the Fund for the new library wing, met with prompt response. Within four days after the mailing of their letter to all members of the Garden on September 15, 1959, twenty-one had responded with donations totaling $900. The first response came from Mrs. F. R. Kellogg of Morristown, New Jersey.

Earlier contributions to the Library Building Fund were made by: Mrs. Roy Arthur Hunt, Mrs. Ernest G. Vietor, Mrs. Mortimer J. Fox, Clarence McK. Lewis, Hunt Foundation, Edwin DeT. Bechtel, Mr. and Mrs. Charles Stradella, and Mrs. Hermann G. Place.

1959 Venezuelan Expedition of The New York Botanical Garden

During the period May 1-September 2, 1959, Territorio Amazonas, Venezuela, was visited by a New York Botanical Garden field party consisting of J. J. Wurdack and Lincoln S. Adderley of the Gardening Department, and four Venezuelan woodsmen, headed by J. S. Level. The chief scientific purpose of the trip was to provide a more adequate representation of the Amazonas rainy-season flora.

Transportation to and from Venezuela was provided by Gulf Oil Corporation. Mene Grande Oil Company (Gulf) provided quarters in Puerto La Cruz, as did Orinoco Mining Company (U. S. Steel) in Ciudad Piar. Creole Oil Company provided thirty drums of gasoline for travel within Amazonas. Particular hospitality was provided in Puerto La Cruz by Mr. Prestridge, Mr. Goddard, Mr. Franquet, and Mr. Michelson; at Ciudad Piar, work was especially facilitated by Mr. Wright, Mr. Reynolds, and Mr. Liddecote.

The dried plant collections made during the trip totalled 1,143 field numbers (about ten thousand specimens), with Leguminosae, Rubiaceae, and Orchidaceae being the families most abundantly represented. For Yale and Syracuse Universities, 483 wood samples were collected. Mr. Adderley gathered about eight hundred living plants and seed lots as follows: five hundred Orchidaceae, two hundred miscellaneous living plants (chiefly Araceae, Bromeliaceae, Cycadaceae, and Gesneriaceae), and one hundred seed lots (with Palmae predominant). Living canes of twelve common manihot cultivars were collected for Dr. David J. Rogers, Curator of Economic Botany at the Garden.

The weather conditions in the Orinoco valley in 1959 were somewhat abnormal. The "summer" of 1958-59 was the driest in many years (the driest in twenty years in nearby Trinidad). June was the rainiest June in many years in Territorio Amazonas, with the low river levels having been made back up to normal rainy-season depths by July 1. July was a normal rainy-season month. At the beginning of August, the rains had slackened somewhat. The Orinoco at Puerto Ayacucho had fallen about two feet from its crest by August 13, showing

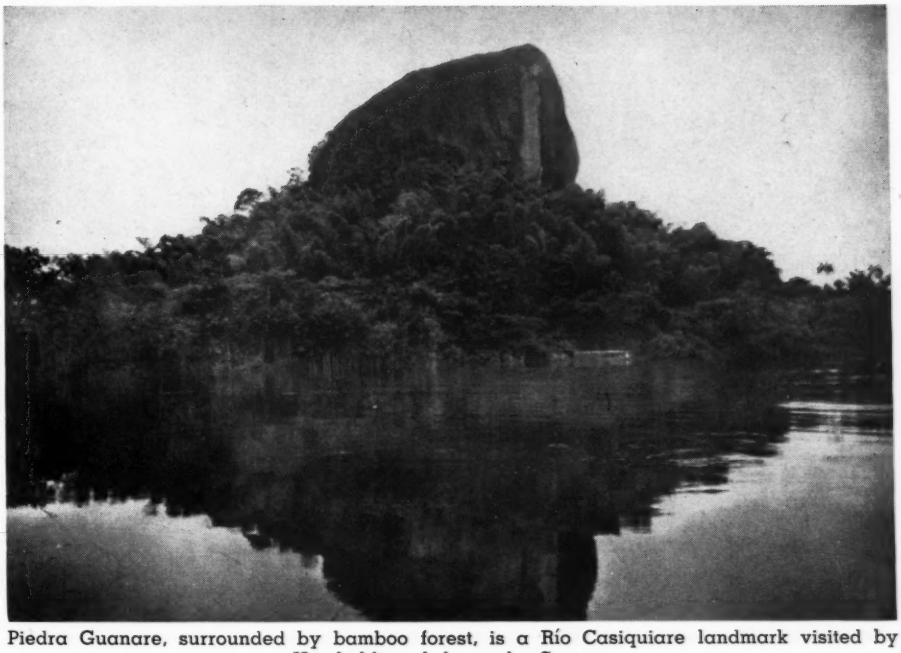
Showy orchids, such as this catasetum, are conspicuous along the upper Orinoco during the rainy season.

Part of a morning's field work, displayed by Lincoln Adderley and two Venezuelan woodsmen.

then a water-level height above sea-level of fifty-seven meters. The Orinoco was still slowly rising at Ciudad Bolívar on August 17, influenced not only by the time lag of the water from Puerto Ayacucho but also the heavy flooding of the Meta and Apure rivers; the flood crest at Ciudad Bolívar was probably to be that of a normal year.

The itinerary in Territorio Amazonas covered the Río Atabapo, the Río Orinoco as far upstream as Tama-Tama, the Río Casiquiare, the lower Ríos Yatua and Siapa, the Río Guainía, and Caño San Miguel as far upstream as the mouth of Caño Ikebenie (about 70 river kilometers from the Guainía). In the lowland area, particular attention was directed to the savanna floras. Of the nine savannas visited, six (Río Orinoco-Sabanita Morocoto, Sabana de Moyo, Sabana Jivoa; Río Atabapo-Sabana Cumare, Sabana Caname, Sabana Manacal) had not previously been visited by New York Botanical Garden expeditions. Unfortunately the rich savannas at Yapacana, Caño San Miguel, and the Río Pacimoni were all flooded, with 2-5 meters of water preventing collections of herbs and low shrubs.

Two Roraima-sandstone areas were visited for the first time: Cerro Cariche (elevation three hundred and fifty meters, left bank of Río Orinoco about midway between Tama-Tama and San Antonio) and a nine hundred-meter hill on the right bank of the Rio Siapa just below Raudal Gallineta. Perhaps the richest collecting area of the entire trip was the region around Raudal and Salto Gallineta, on the Río Siapa seventeen to nineteen hours river travel from the Rio Casiquiare. Here the Roraima-formation sandstone came to within at most two hundred meters above the granitic river basement and one Navia species was collected at the crystalline basement rock level. Geographically, the Siapa journey showed that the river course is immediately on the north and northeast sides of Cerro Aracamuni, thus confirming tentative observations made from Cerro Neblina and Piedra Araucaua on the Río Yatua during earlier expeditions; a Kodachrome panorama was taken of the north side of Cerro Aracamuni. Rock samples of Cerro Cariche, the basement rock along the Río Siapa at Raudal Gallineta, and the sandstone rock of the Roraima-formation hill at Raudal Gallineta were forwarded to C. D. Reynolds at Ciudad Piar.



Piedra Guanare, surrounded by bamboo forest, is a Río Casiquiare landmark visited by Humboldt and drawn by Spruce.

Two botanical features of the expedition were noteworthy. The lowland Orchidaceae and Bromeliaceae seem predominantly rainy-season flowerers, since the collections in these two families were much richer than on previous dry-season lowland trips. The second feature, which will be more firmly established as collections are identified, is the complexity and reticulate distributional patterns of the lowland savanna floras; generalizations on the geographical distribution of savanna species appear to be increasingly difficult.

JOHN J. WURDACK
Associate Curator

Staff Members' Activities

Dr. H. W. Rickett, Acting Assistant Director (Botany) and Bibliographer, attended meetings of the Nomenclature Section of the Ninth International Botanical Congress at Montreal August 16-19, 1959, and stayed for additional programs. Nomenclatural discussions led to few important changes in the International Code of Botanical Nomenclature. Conservation of specific names, long proposed and debated, was rejected, but a means for future study was set up for the benefit of non-botanists who must use botanical names and had been troubled by changes in them.

In Dr. Rickett's capacity as Secretary of the Committee for Spermatophyta, he presented a report on proposals for conservation of generic names which had been published in TAXON.

During September, Dr. Rickett and Dr. F. A. Stafleu of the University of Utrecht, The Netherlands, conferred at the Garden on matters pertaining to a complete revision of the list of conserved generic names (as reported in the Garden Journal. Sept.-Oct. 1958, pages 17, 184) they had undertaken a year ago. Preparation of the final manuscript is in progress, one part has been published; and Dr. Rickett and Dr. Stafleu worked out several problems which will permit publication of ensuing installments.

The sandstone foothills of Cerro Aracamuni on the Río Siapa had never been visited by botanists before The New York Botanical Garden's 1959 expedition.

At the Council of the Mycological Society of America held in Montreal during the Ninth International Botanical Congress, Dr. Clark T. Rogerson, Curator of the Cryptogamic Herbarium, was appointed the Society's historian.

During the Congress, Dr. Rogerson went on a field trip with pteridologists to Rouge Mont, southwest of Montreal, and after the Congress joined one hundred and fifty botanists on a three-day visit to Ottawa. One day was spent in the mycological laboratories and herbarium of the Plant Research Institute of the Canada Department of Agriculture. Fourteen full-time mycologists are engaged, most of them in fungus taxonomy or forest mycology.

From September 2-8, Dr. Rogerson participated with some thirty other mycologists from Canada, the United States and foreign countries in a mycological foray to Quebec City and environs led by Dr. R. Pomerleau. The heavy rains of the two weeks previous brought forth the largest

For more and better
plants from cuttings . . .

Try the simple "Rootone Dip!"

New, improved Rootone now contains indole butyric acid that adds new rooting power to its already effective formula. Use Rootone for softwood, hardwood or summer cuttings. Rootone with fungicide added helps prevent "damping off" and other soil-borne diseases. ¼-oz. packet 35c; 2-oz. jar $1.25.

AMCHEM **ROOTONE**

AMCHEM PRODUCTS, INC.
(Formerly American Chemical Paint Co.)
Niles, Calif. • AMBLER, PA. • St. Joseph, Mo.
Rootone and Amchem are registered trademarks of Amchem Products, Inc.

number and kinds of fleshy fungi that Dr. Rogerson has ever seen. He obtained many specimens of his own special group (Hypocreales).

Dr. Arthur Cronquist, Curator, visited Pomona College, Pomona, California, to see the Marcus Jones collection on the Great Basin, before beginning field work in southeastern Oregon in mid-April. He found that after the very dry winter and cold spring collecting moved slowly at first. However, because of the winter and spring conditions, he did obtain some specimens he might otherwise not have collected. Along in May, things began to move, then came with a rush and continued so until he had to stop collecting the end of July to confer with Prof. Arthur Holmgren of Utah State University at Logan, Utah. Dr. Cronquist and Prof. Holmgren went over their plans for collaboration on a Flora of the Intermountain West.

Dr. Cronquist collected 7,500 specimens of over 700 numbers. There may be three new specimens among them; these await further determination.

Dr. Herman F. Becker, Visiting Research Associate, spent two months in the field in southwestern Montana where he collected many palaeobotanical specimens. He believes that seventy or so have not previously been reported. This collecting trip was taken in connection with Dr. Becker's research on the Tertiary Ruby Flora of that area.

T. H. Everett, Assistant Director (Horticulture) and Curator of Education of The New York Botanical Garden, was guest speaker at the annual banquet of the Ohio Association of Garden Clubs, Inc., in Cincinnati, September 11, 1959. The title of his talk, "The Gardener's Craft," was chosen as the theme of the Association's two-day conference.

Mr. Everett and Mrs. Dorothy Ebel Hansell, Editor of The Garden Journal, were among the four hundred guests from political, civic and gardening circles at the inaugural planting of Sterling Forest Gardens near Tuxedo Park, New York, on September 17, 1959. They witnessed the planting of tulip bulbs by Her Royal Highness, Princess Beatrix of The Netherlands—the first of the million and a half tulips, narcissi, hyacinths and other bulbs to be planted there. Sterling Forest Gardens will be opened to the public next spring.

Mrs. Hansell represented The New York Botanical Garden at the forty-fifth annual conference of the National Association of Gardeners, Philadelphia, August 25 - 27, 1959. At the annual banquet, the Association's gold medal was presented to Mrs. Ricardo C. Gonzales for her outstanding contribution to horticulture as evidenced by her beautiful estate at Rye, New York, by her generously making the estate available to The New York Botanical Garden and the Horticultural Society of New York, and by her continued interest in and support of the International Flower Show, at which she is a prominent exhibitor.

All-American Rose Selections will be displayed at The New York Botanical Garden. Dr. William C. Steere, Director, is happy to announce that on recommendation of Mrs. D. Bobbink White, President of Bobbink and Atkins, Rutherford, N. J., the Rose Garden was recently approved for re-instatement as an accredited All-American Rose Selection Public Garden displaying A.A.R.S. varieties.

"Floriade," Rotterdam. Plans have been prepared for the middle income American family dwelling complete with garden, patio, barbecue pit and pets, which will be the show-case of the U.S.A. exhibit at "Floriade," Rotterdam, The Netherlands, March 25-September 25, 1960.

Dr. Russell Seibert, Chairman of the American Horticultural Council Committee on "Floriade," said that "never before has the United States taken the opportunity to present its horticultural accomplishments abroad to the rest of the world, in the ornamental as well as in the edible sectors. The fact that the United States is one of the leading countries, if not the foremost in the field of horticulture . . . is a fact that hitherto has not been demonstrated to the world."

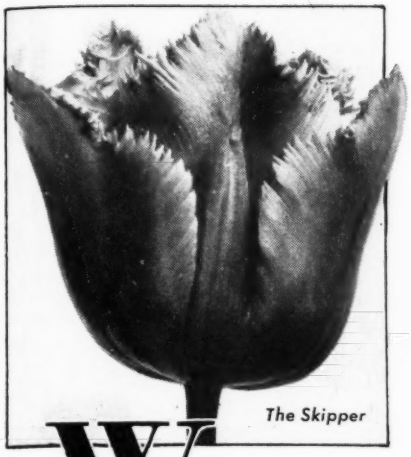
Organizations interested in cooperating in the U.S. exhibit should communicate with General Director Carl F. Wedell, U. S. "Floriade" Exhibit, 640 Fifth Avenue, New York 19, N. Y. During Mr. Wedell's trips to Rotterdam to oversee the site planning and planting, Miss Frances Borden can be reached at this address.

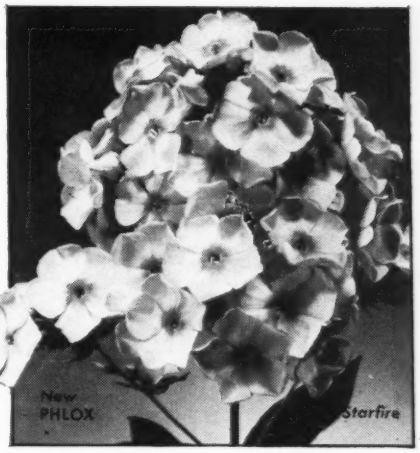
The U.S.A. exhibit at "Floriade" is a cooperative project between the Foreign Agricultural Service, U.S.D.A., and the American Horticultural Council. The appropriation of $150,000 by the U. S. Congress is available only in foreign currencies. Hence it is necessary to raise a fund in American dollars for expenditures in this country.

Any organization or individual desiring to contribute to this project may send their check payable to American Horticultural Council, U.S.A. Exhibit Fund, to the above-mentioned address.

Visitors to The Garden. The New York Botanical Garden welcomed many distinguished visitors in late summer and early fall, a number calling here to and from the Ninth International Botanical Congress.

Dr. Hans Melchior, Director of the Botanical Garden and Museum, Berlin-Dahlem, and Mrs. Melchior
Dr. Lyman Benson, Pomona College, California
Dr. Margaret Fulford, University of Cincinnati, Ohio
Dr. Sherwin Carlquist, Rancho Santa Ana Botanic Garden, California
Dr. W. Robyns, Director of the Jardin Botanique de l'Etat, Brussels
Dr. J. Moureau, Chief of the Center of Scientific Research, Belgian Congo
Dr. C. R. Metcalf and Dr. Jane Taylor, Royal Botanic Gardens, Kew
Dr. W. Ruthmaler, Institute-für Agrobiologie, Greifswald, Germany
Dr. Peter Green, Edinburgh Botanic Garden
Dr. Kjeld Holmen, Botanical Museum, Copenhagen
Dr. P. A. Florschütz, Dr. F. A. Stafleu, Botanical Museum, Utrecht
Dr. Sinske Hattori, Nichinan Muyazaki, Japan
Dr. Y. Kuwahara, Miami University, Oxford, Ohio
Dr. T. S. Mahabale, University of Poona, India
Dr. Miriam de Vos, University of Stellenbosch, South Africa
Dr. R. A. Dyer, Division of Botany, Pretoria, South Africa
Dr. R. F. Scagel, University of British Columbia, Vancouver
Dr. Sanski Imai, Yokahoma National University, Japan
Dr. Albert W. Herre, Stanford University, California
Dr. M. Diaz-Piferrer, Universite de Oriente, Santiago, Cuba
Dr. J. A. B. Nolla, University of Mayaguez, Puerto Rico, who is presently working on two new fungous diseases of *Amaryllis*
Dr. Yukio Yamada, Hokkaido University, Sapporo, Japan
Het Ram Kalia, Agricultural College, Panjab, India
Dr. Siro Kitamuri, Kyoto University, Japan
Prof. Dr. Hikmet Birand, Ankara, Turkey
Dr. Behram Kűi, Ministry of Education, Turkey
Dr. T. J. Walsh, Director of the National Botanic Garden, Glasnevin, Dublin
Thomas Furman, Escuela Agricola, Panamericana-Tegucigalpa, Honduras
Bungo Wada, Botanical Institute, Faculty of Science, University of Tokyo
Dr. R. Potonie, University of Bonn, Germany
Dr. J. J. Barkman, Royal Herbarium, Leiden
Dr. Karl Rechinger, Natural History Museum, Vienna
Dr. Bertil Lindquist, Director, Botanical Garden of Göteborg, Sweden
Mrs. Roxanna Ferris, Stanford University Editor of Abram's FLORA OF THE PACIFIC STATES
Dr. Rimo Bacigalupi, University of California (Curator of the Jepson Herbarium)
Professor P. N. Mehra, Panjab University, India
Dr. Kasin Suvatabandhu, Department of Agriculture, Bangkok, Thailand

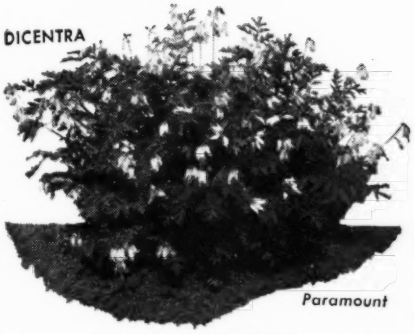




Wonderful things happen

WHEN YOU PLAN WITH A

Wayside catalog



Three New DICENTRAS

Three fabulous new Dicentras that bloom perpetually all summer and fall. Similar in growth and habit to popular "**Bountiful**". Easy to grow, hardy at 10 below zero. **Paramount** (Pat. 1594) Stunning lacquer-red flowers with bottle green foliage. **Debutante** (Pat. 1595) Dainty blush-pink flowers. **Silversmith** (Pat. 1596) Lovely ivory-white to white.

New PINK DAFFODIL

We consider **Louise de Coligny** the most unusual of the exquisite pink daffodils. A cluster will perfume the surrounding area with a delightful scent of violet and vanilla. Although delicate and fragile in appearance, it is extremely hardy, easy to grow and a rapid multiplier. 6 bulbs produced 27 lovely flowers the 2nd year. Catalog features 10 other pink beauties of unrivaled perfection.

If you like the newest and best in horticulture, prepare to lose your heart to Wayside's colorful, 152 page Fall Catalog. It unfetters the imagination and brings you a refreshing new experience in sheer gardening pleasure. Among the more than 1300 magnificent garden subjects of unequaled quality and beauty, you will find much to send your spirits soaring. . . . Superb new shrubs, glorious roses, new tulips, exotic lilies, rare new bulbs and hardy "**Pedigreed**" plants.

Rare Bearded TULIP, *The Skipper*

Here is a real collector's item. A tulip so beautiful and artistic in coloring, it is almost unbelievable. Large, goblet-shaped flowers are a deep bluish violet . . . lovely grey-blue base accented by a yellow, bronze-shaded star. Daintily laciniated petals have a tawny margin flushed golden brown. Pleasantly fragrant too.

New HARDY PHLOX, *Starfire*

Worthy claimant of the title "Most beautiful red phlox in the world." Put it in a border for magnificent, massed color . . . you'll find it a magnet for all eyes. Very hardy and easy to grow. A truly exciting new phlox.

Beautiful PHILADELPHUS, *Innocence*

Most prolific flowering Mockorange. Arching branches are so heavily laden with flowers they resemble sheaves of blooms. Intense whiteness of lovely alabaster white flowers creates a striking ethereal effect. Pleasing delicate Jasmine fragrance.

New FLORIBUNDA, *Allgold*

Exquisite flowers of the deepest, clearest gold will brighten your garden come rain or shine. In all kinds of weather, these beautiful firm blooms will retain their full, vibrant yellow until the petals drop. Experienced growers all over the world rate **Allgold** tops for stability of color, freedom of flower and health of growth.

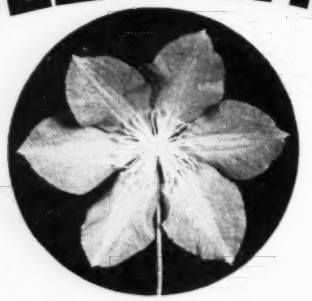
SEND FOR THE WORLD'S FINEST HORTICULTURAL BOOK-CATALOG

*A catalog so complete it belongs in every gardener's library. It's a valuable reference book with hundreds of true-color illustrations and more factual cultural information than many garden books. To get your copy of this finest of all garden catalogs, please enclose $1.00 to cover postage and handling costs. Don't delay — send for this outstanding 152 page garden book today! No other catalog in America can compare with it in size or wealth of selection. It features a magnificent selection of over 1300 new roses, flowering shrubs, trees, rare bulbs, exotic lilies and hardy "**Pedigreed**" plants, all grown and rigidly tested in America's most carefully supervised nursery.*

Wayside Gardens

91 MENTOR AVE. MENTOR, OHIO

CLEMATIS



Breath-Taking Beauty for *Your* Garden

Hardy, perennial, fast becoming the most popular vine in America—and with good reason. It has so many uses—climbs on wall, fence, porch trellis, lamp post, as a garden background or indoors for winter bloom. Wide range of colors, many varieties have huge blooms up to 6 to 8 inches across. Easy to grow with helpful tips we send.

"TRY-COLOR" SPECIAL

Here's an exceptional offer. One each of Jackmani, purple; Languinosa, white; and Crimson Star, red; all 2 year old plants. All three plants shipped at your best planting time.....

3 for $5.38 postpaid

(One for $1.95 ppd.)

Order now, by mail.
Satisfaction Guaranteed

Full Color Catalog FREE

Sixteen pages of beautiful varieties of Clematis plus other vines and ornamentals. Much valuable cultural information also included. Ask for a copy today.

JAMES I. GEORGE & SON, INC.
Fairport 24, N. Y.
World's Largest Clematis Growers and Propagators

YEAR'S FINEST CATALOG VALUE!
Peonies · Iris · Daylilies

68 pages of gorgeous natural color —over 1300 varieties! **25¢**

America's *finest* book & your *best* source of big, healthy, blooming-size perennials GUARANTEED by the "*Wilds*" of Missouri Packed with money-saving offers & advice.

Gilbert H. Wild & Son

Send 25c TODAY! Dept. GJ 119, Sarcoxie, Mo.

THE HOME OF RARE TREES

Beautiful Pink Andromeda	$ 7.00
True Hardy Cedar of Lebanon—3-4'	$14.00
Warminster Broom—18"	$ 4.00
Maackia Amurensis—4-5'	$ 8.00

BRIMFIELD GARDENS NURSERY
245 Brimfield Road Wethersfield, Conn.

BOOK ORDERS

Please send your check or money order, made out to The New York Botanical Garden, when you place an order for books through Book Service..

Members are entitled to 10% discount on the list price. Hereafter, the Garden will pay the postage for delivery of books.

Dr. J. H. Willis, Royal Botanic Gardens, Melbourne, Australia
Dr. Arturo Burkart, Darwinion Institute, San Isidro, Argentina
Dr. Oscar Kühnemann, University of Buenos Aires, Argentina
Dr. Carlos Muñoz, National Museum, Santiago, Chile
Dr. Jean Jacques Symoens, University of Elisabethville, Belgian Congo
Dr. Rodolfo Pichi-Sermolli, University of Genoa, Italy
Dr. Thomas Morley, University of Minnesota
Dr. Juan H. Hunziker, Instituto de Botanica, Ministry of Agriculture, Argentina
Dr. W. Szafer, University of Krakow, Poland
Dr. R. Weibel, Conservatoire Botanique, Geneva, Switzerland
Dr. Jean Leonard, Inst. National pour l'Etude Agronom. du Congo Belge, Brussels
Dr. William D. Stern, Yale University
Dr. Efraim Hernandez-X., Escuela Nacional de Agric., Chapingo, Mexico
Dr. A. L. Bernardi, Univ. de Los Andes, Merida, Venezuela.

Dr. Albert W. C. T. Herre, under a grant from the N.S.F., as Curator Emeritus of Stanford University, California, spent some time at The New York Botanical Garden this past summer on his research program. It is a privilege to meet and talk with this keen scientist who can look back upon a long and active career. In 1904, he received an A.B., in 1905 an A.M., and in 1909 his Ph.D. in botany from Stanford University. But prior to earning these degrees, Dr. Herre had been an assistant school superintendent, a principal of a high school, and an instructor in biology and geology in Washington State Normal. He was Chief of the Department of Fisheries, Bureau of Science, Philippine Islands, 1920-1928.

From 1928-46, Dr. Herre was Curator of the Museum of Geology in Stanford, the following year consultant and ichthyologist of a fishing project in the Philippines under the U. S. Fish and Wildlife Service. He was a member of the Faculty School of Fisheries, University of Washington, from 1948 until his second retirement in 1958.

Dr. Herre, who has traveled widely in China and the Malay Peninsula, Borneo and India while Oriental field agent for the U. S. Bureau of Fisheries, admitted to the Editor he was "interested in almost everything but mathematics, but then neither fish nor lichens in which I'm principally interested are concerned with mathematics."

Dr. Carl O. Hansen has been appointed research and extension worker at the Technical Service Center of the Davey Tree Expert Co., Kent, Ohio. He will concern himself principally with insect and disease problems of trees. Dr. Hansen received his B.S. in 1953 from Syracuse University, his M.S. in economic entomology and plant pathology from Cornell in 1955, and his Ph.D. from Cornell in the same course of studies this past July.

Dr. Ray R. Hirt, Senior Professor of Forest Botany, retired on August 31, 1959, after almost four decades of service to the State University College of Forestry at Syracuse University. He joined the College of Forestry in 1921 and received his M.S. in 1924 and his Ph.D. in 1928 in forest pathology from the College.

In 1946, Dr. Hirt became chairman of the Department of Forest Botany and Pathology and in 1955 the first research professor of the College of Forestry.

Although officially retiring, Dr. Hirt will continue his basic studies in the nuclear phenomenon of blister rust pathogen.

He is active in many organizations including the American Phytopathological Society, the National Shade Tree Conference, the American Holly Society, the Men's Garden Clubs.

Edgar Anderson, Engelman Professor of Botany at Washington University and Curator at the Missouri Botanical Garden, has been awarded a fellowship at the Center of Advanced Study in Behavioral Sciences, Stanford, California, for part of the academic year 1959-60. Dr. Anderson will work on the system he has devised to interpret by graphic methods complicated data and their application in behavioral sciences. He has been at Princeton University recently as a visiting fellow in mathematics.

Dr. Louis G. Nickell, Plant Pathologist, of Charles Pfizer & Co., Brooklyn, New York, informed the American Chemical Society during a symposium at Atlantic City, New Jersey, September 15, 1959, that cells which make up yams, potatoes and beans may now be produced as free floating cells in large volume. The plant-cell growing techniques are similar to those used in culturing molds in deep tanks to produce antibiotic drugs.

One of the plant tissues produced in large volume came from dioscorea, the Mexican yam that is used as a source of steroid cortisone. Dr. Nickell stated that the research which has been conducted in the Charles Pfizer laboratories suggests possibilities in better production of plant substances, steroids and alkaloids, which are valuable drug sources.

Thomas P. Reilly, President of Ra-pid-Gro Corporation, was one of five recipients of citations presented by the American Horticultural Council during the fourteenth American Horticultural Congress in Rochester, New York, October 6-10, 1959.

The citation to Mr. Reilly reads: "The American Horticultural Council through its Board of Directors presents this citation to you, Thomas P. Reilly, of Dansville, New York, for demonstrating in a practical way that plants could be fertilized through their leaves; for being the first to develop and market an effective plant food for foliar feeding; and for opening the way to a new cultural practice in horticulture."

BOOK REVIEWS (from page 220)

garden and around the pool.

This latest book on daffodils compares favorably with books on the subject already published.

JAMES G. ESSON
Great Neck, Long Island

HANDBOOK OF TOXICOLOGY, VOLUME III: INSECTICIDES. William O. Negherbon. 854 pages, indexed. W. B. Saunders Company, Philadelphia & London. 1959. $14.00.

This volume was prepared under the direction of the committee on the Handbook of Biological Data, Division of Biology and Agriculture, the National Academy of Sciences, the National Research Council.

The book is primarily a reference book, reviewing one hundred and eighty-eight

chemical compounds used as insecticides. Each insecticide is designated by its common name and chemical formula, and its physical and chemical properties are described. The toxicology of each compound is fully discussed, giving available information on its toxicity to insects, plants, man, higher animals; its acute and chronic poisoning, symptoms of poisoning, mode of toxication, health hazard and various formulations for practical application.

The Introduction describes and defines various formulations of pesticides, such as: emulsions, aerosols, dusts, wettable powders, synergists, repellents, attractants, ovicides, acaricides and methods of application.

The major part of the book (pps. 1-780) deals with the individual insecticides and their properties. An extensive bibliography, (pps. 781-829) consisting of 3,404 references, alphabetically author-indexed, enhances the value of the book. The index of scientific and common names of insects also adds to the value of the contents.

JOSEPH M. GINSBURG
Rutgers University
New Brunswick, New Jersey

COMMERCIAL FRUIT AND VEGETABLE PRODUCTS. 4th Ed. W. V. Cruess. 884 pages, illustrated, indexed. McGraw-Hill Book Co., New York. 1958. $15.00.

The text explains in detail the various commercial methods of processing and preserving of vegetables, fruits, and extracts. The many practical aspects which enter the picture on prevention of spoilage, use of by-products, detection of contaminants, and appropriate equipment for most plant foods of commercial significance in the United States are discussed.

Chapter 30, on wine making, and Chapter 26, on olive and coconut oils, of former editions have been dropped. New information on canning, freezing, drying, and so on have been added.

DAVID J. ROGERS

PHYSIOLOGY OF FUNGI, Vincent W. Cochrane. 524 pages, indexed. John Wiley & Sons, Inc., New York. 1958. $9.75

PHYSIOLOGY OF FUNGI by Vincent Cochrane, Professor of Biology at Wesleyan University, is a well-written, well-organized, and detailed survey of the present status of fungous physiology. The author is not content with the mere citation of almost five thousand published research papers; he attempts to evaluate the information contained in these papers and to draw certain conclusions therefrom. Eight chapters of this book are devoted to nutrition and metabolism of the fungi. The remaining six chapters are concerned with growth and composition of fungous cells, reproduction, spore germination, and the action of physical and chemical agents on fungi.

PHYSIOLOGY OF FUNGI by Cochrane should not be confused with PHYSIOLOGY OF FUNGI by Lillian Hawker and PHYSIOLOGY OF FUNGI by Lilly and Barnett, also published during this decade.

ALMA W. BARKSDALE

THE SCIENTIFIC PRINCIPLES OF CROP PROTECTION—Fourth Edition, Dr. Hubert Martin. 359 pages, indexed. St. Martin's Press, Inc., New York. 1959. $12.50.

The fourth edition of this valuable book, published nearly twenty years after the previous one, brings up to date the scientific principles underlying modern methods of controlling crop pests. Included in the chapter on biological control is a discussion of the early work on controlling insect pests with *Bacillus thuringiensis*, a method currently being widely investigated by the research staffs of universities and commercial organizations. Dr. Martin is director of the Science Service Laboratory at London, Ontario, Canada.

Primarily a book for the student and professional in the field of crop protection, it is too technical for amateur gardeners.

P. P. PIRONE

JUST ADD TO WATER, SPRINKLE OR SPRAY!
Sold by Leading Nurseries and Garden Supply Dealers.
NET WEIGHT 5 POUNDS
RA-PID-GRO
In Use Since 1932
Instantly Soluble
The Miracle Plant Food
FEEDS PLANTS 5 WAYS!
SPRAY OR SPRINKLE
ORIGINAL NUTRITIOUS RA-PID-GRO

RA-PID-GRO

The original instantly soluble high-nutrition plant food: Nitrogen 23%, Phosphoric Acid 21%, Potash 17%, plus important trace elements. Made only by RA-PID-GRO Corp., Dansville, N. Y.

ADVANCES IN PEST CONTROL RESEARCH, Volume II, R. L. Metcalf (ed. by). 433 pages, illustrated, indexed. Interscience Publishers, New York. 1958. $12.50

Various phases of the pest control problem are presented by ten internationally recognized scientists. Most of the material is much too technical for the lay reader. The book should be very helpful to graduate students majoring in various phases of pest control and to professional entomologists, plant pathologists, plant physiologists and agricultural engineers.

P. P. PIRONE

FLOWER-GROWING FOR SHOWS, E. R. Janes. 224 pages, illustrated. Penguin Books, Inc., Baltimore, Maryland. 1959. $1.25

Many practical hints on selecting, picking, packing and preparing for the exhibition table, as well as cultural requirements, are to be found in the handbook by Mr. Janes who, until his death in 1958, had been responsible for many years for Sutton and Sons' exhibits at flower shows and for thirty years was a member of the "Floral Committee A" of the Royal Horticultural Society. American gardeners will find the information useful, if they bear in mind the differences in cultural practices.

ROSES, F. Fairbrother. 180 pages, illustrated, indexed. Penguin Books, Inc., Baltimore, Maryland. 1958. $.95

This handbook, prepared by the President of the National Rose Society in collaboration with the Royal Horticultural Society, gives practical information on planting, pruning and exhibiting, but the American reader must take into consideration that cultural practices are not the same in England as in this country, due to different climatic conditions.

The chapters on The Ancestry of our Modern Roses and Planning the Rose Garden are altogether worthwhile.

CHRYSANTHEMUMS, Frank Kyle. 192 pages, illustrated, indexed. Abelard-Schuman, Ltd., New York. (Printed in Great Britain). 1958. $3.75

Culture of chrysanthemums in England varies from the culture of these flowers as practised in this country. Therefore, this book is not for the novice seeking information on how to grow chrysanthemums in the U.S.A. But the experienced grower, able to allow for variations in climatic conditions and aware of the different varieties grown, will find this an interesting addition to his bookshelves.

ROCK GARDENS—HOW TO PLAN AND PLANT THEM, A. Edwards. 256 pages, illustrated, indexed. Abelard-Schuman, Ltd., New York. 1958. (Printed in Great Britain). $5.00.

This is another printing of this book which made its first appearance in 1929 and had six reprintings between that year and

Are YOU *Enjoying the Privileges of Membership?*

- Reduced rates for study courses, lectures, tours and other activities for which the Garden charges fees.
- Subscription to The Garden Journal—every member of your family will enjoy reading this bimonthly magazine — and Addisonia, published irregularly.
- Share in the annual plant distribution.
- Discounts on the purchase of books, bulbs and plants.
- Admission to Members' Day Programs and to previews of special events.
- Personal conferences and identification of plant material.
- Use of the Library and, under staff guidance, the Herbarium.
- Free rides on the "Floral Flyer" (tractor train), and free parking on weekends and holidays.

Annual Member *annual fee* $	10.00
Life Member *single contribution*	250.00
Contributing (Sustaining) Member *annual fee*	25.00
Contributing (Fellowship) Member *annual fee*	100.00
Fellow for Life *single contribution*	1,000.00
Garden Club Affiliate *annual fee*	50.00

Why Not Join Now?

Send application and check to

Membership Secretary

THE NEW YORK BOTANICAL GARDEN
BRONX PARK
NEW YORK 58 NEW YORK

Second Printing Revised

The New Britton and Brown Illustrated Flora

of the Northeastern United States and adjacent Canada
by H. A. Gleason and Collaborators

IS NOW AVAILABLE

3 Vols. $30 plus $1.00 handling and postage on domestic orders
—foreign orders, full postage

Orders should be directed to:

THE NEW YORK BOTANICAL GARDEN
Bronx Park New York 58, N. Y.

1949. This should indicate its popularity with English gardeners, and American gardeners, too. There have been few really good books on the subject down through the years, and American rock gardeners have learned to read English books and then adapt the information to fit American conditions.

ROCK GARDEN PLANTS—NEW WAYS TO USE THEM AROUND YOUR HOME, Doretta Klaber. 173 pages, illustrated. Henry Holt & Co., New York. 1959. $3.95.

In the words of the author, her book is "only an introduction to the beautiful alpine and associate plants we can grow in our gardens." Many of the plants, presented in alphabetical order, are illustrated with Mrs. Klaber's pleasing pen and ink sketches. The text is concise—one might wish that in some cases it could have been elaborated.

THE AMARYLLIS MANUAL, Hamilton P. Traub. 338 pages, illustrated, indexed. Macmillan Company, New York. 1958. $7.50

The author, principal physiologist with the U.S.D.A. for twenty-two years prior to his retirement in 1952, has long been interested in plant breeding, particularly with artifically made polypoids. In this manual he presents comprehensive and helpful information on the history, culture and uses of amaryllis—yet portions of the text are controversial.

FLOWER ARRANGEMENT IN THE CHURCH, Katharine M. McClinton. 122 pages, illustrated. Morehouse Gorham, New York. Seventh printing, 1958. $2.50.

The seventh printing, revised, of this very useful book "includes suggestions for arrangements in churches of contemporary architectural design."

The author spent three years directing and arranging flowers for the Church of the Heavenly Rest so is practised in the art about which she writes.

A HANDBOOK OF CHRISTMAS DECORATION, Dorothy Waugh. 143 pages, illustrated, indexed. Macmillan Co., New York. 1958. $3.95

Mrs. Waugh, who has received recognition as artist and decorator, has illustrated with pictorial and diagramatic drawings her suggestions for wrapping and decorating gift packages, making wreathes and garlands—both of living and artificial material, decorating food, and has included a chapter Especially for Children.

TRANSPLANTING OF TREES AND SHRUBS IN THE NORTHEASTERN AND NORTH CENTRAL UNITED STATES, National Shade Tree Conference and National Arborist Association, Ohio. 73 pages, illustrated. 1958. $1.00

This is a revision of the publication first issued in 1943 in response to a request from the Camouflage Division of the Armed Forces. Covering selection of plant material, digging and transplanting operations, it is especially useful for nurserymen, arborists and landscape gardeners, but the home gardener will also find its text informative.

ALASKA WILD FLOWERS, Ada White Sharples. 152 pages, illustrated, indexed. Stanford University Press, Stanford, California. 1958. $3.75

This is a reprint of a book first published in 1938, for which there is quite a demand with so little literature available for the lay person on the wild flowers of this new state of the Union.

FLOWERS OF THE WORLD IN FULL COLOR, Robert S. Lemmon and Charles L. Sherman. 280 pages, illustrated, indexed. Hanover House, Garden City, New York. 1958. $7.50.

There are literally hundreds of colored plates to illustrate the hundreds of temperate and tropical plants of both the Old and the New World, which are mentioned in the accompanying text. Some of the plates are good, but in too many the colors do not do justice to the flowers; the colors are dark or "muddy."

OUR NATIONAL PARKS AT A GLANCE, Monroe Heath. 32 pages, illustrated. Pacific Coast Publishers, Redwood City, California. 1959. $1.00.

This Volume, No. VII in The Great American Series, calls attention by pictorial and verbal description to the dramatic beauty or the serenity of some of our National Parks located in different states, including Hawaii and the Virgin Islands.

OUTDOOR LIVING ROOMS, Earle W. Gage. 160 Pages, illustrated. Popular Mechanics Press, Chicago, Illinois. 1958. $.75.

There are interesting chapters on planning and landscaping outdoor living rooms, another on fences—all with helpful illustrations and diagrams. Other chapters are concerned with floors, lighting, furniture and cooking.

OUR GROWING WATER PROBLEMS, R. G. Lynch. 61 pages. The National Wildlife Federation, Washington, D. C. 1959. $.25.

This publication deals with the complex problems of managing public water resources for the diverse and conflicting needs of a rapidly expanding human population.

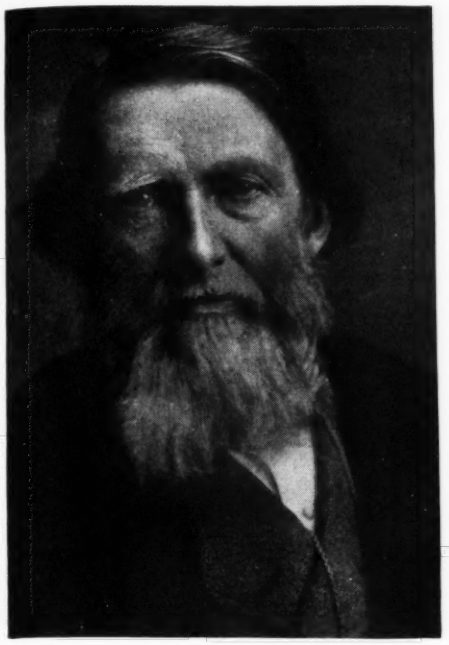
THE ARBORETUMS AND BOTANICAL GARDENS, Donald Wyman. 69 pages, illustrated, indexed. The Arnold Arboretum of Harvard University, Jamaica Plain 30, Mass. 1959. $1.50.

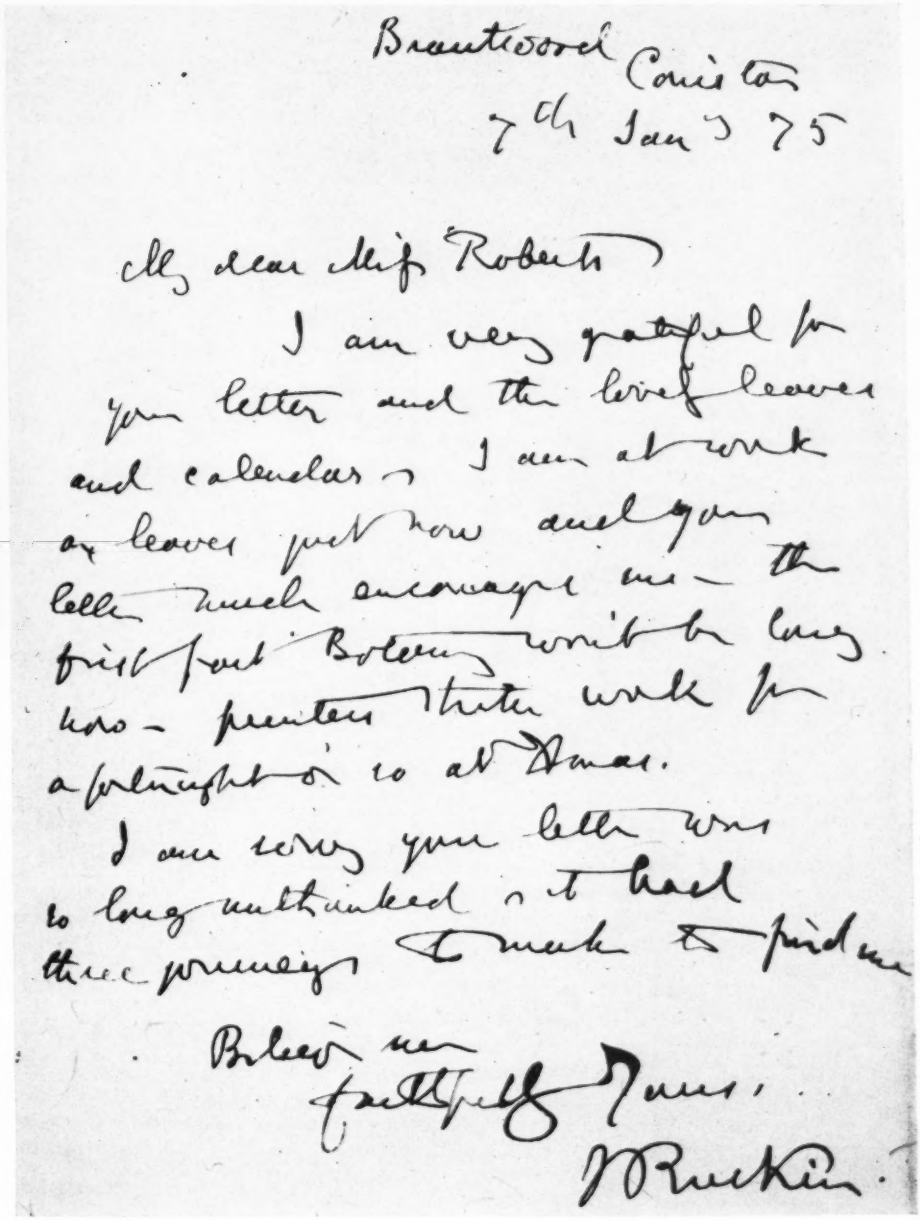
This brings up to date the information originally compiled by the author and published in 1947. It adds data about collections developed in the last twelve years and revises old data. This is a valuable reference for all botanical and horticultural libraries.

1001 QUESTIONS ANSWERED ABOUT TREES, Rutherford Platt. 318 pages, illustrated and indexed. Dodd, Mead & Company, New York. 1959. $6.00.

One of a series of "1001 questions answered about . . .", all published by Dodd, Mead. There are six general headings: 1. History and facts, 2. Forestry, 3. Home trees, 4. Tree Products, 5. Tree pests and diseases, 6. The tree as a living thing, and an index.

Mr. Platt has taken on a job that I would shudder to assume. He has first to select the appropriate questions, then provide accurate short answers in lay terminology. One may think it a simple matter to pose questions, but any teacher can give evidence of the tremendous difficulties involved in constructing questions which are not ambiguous. As an example, question #1: "What is a tree?" At first glance this is a very simple question for most of us *know* what a tree is, but upon reflection, we can find many exceptions to any definition, and that given by this book is far from satisfactory. In the same group of questions, under "history and facts" the questions pertaining to tree origins and associated questions pose problems upon which there is very little





Brantwood Coniston
7th Jan 75

My dear Miss Roberts

I am very grateful for your letter and the leaf leaves and calendars — I am at work on leaves just now and your letter much encourages me — the first part Botany — will be long hard — painters study work for a fortnight or so at Xmas.

I am sorry your letter was so long unthanked — it had three pennies to pay on

Believe me
faithfully yours,
J Ruskin.

Upper left. John Ruskin
Above. Letter addressed by Ruskin to Miss Margaret Roberts, North Queens, Surrey, North Britain. Both were presented to the Library of The New York Botanical Garden by Dr. Cecil Yampolsky, member of the Garden.

exact information, although the answers given leave the impression that the answers are entirely satisfactory, which is far from the case.

In certain areas Mr. Platt is on firm ground for the responses to the questions deal with heights of trees, the weight of the seed of the "big tree", the first tree products exported from this country, etc. But in general I have many uneasy feelings about the real value of this collection of unrelated facts and unrelated questions. A person interested in the general subject "trees" would do well to look elsewhere.

DAVID J. ROGERS

MITOGENESIS, Howard S. Ducoff and Charles F. Ehret. 114 pages. University of Chicago Press, Chicago, Illinois. 1959. $3.25.

This small volume resulted from the edition of the discussions on mitosis by a small group of biologists representing various disciplines. It was one of a series of similar meetings designed to bring together experts from many fields to focus their attention on one topic in a free exchange of ideas. Perhaps such meetings are useful and stimulating for the participants, but if the present volume is a fair sample, publication of the proceedings is hardly justified.

The discussions centered around the causes of growth and differentiation which involve cell division and more specifically the factors which cause a cell to divide or to undergo the changes that lead to cell division. The mechanics and chemistry of the processes were considered first. Ideas on mitotic triggers and endogenous stimuli of mitosis were then introduced and were followed by a discussion of cell interactions in relation to environment. The last half of the book deals with the origin of diversity and degrees of differentiation in cells.

In spite of a considerable effort on the part of the editors to bring organization into the presentation and to verify opinions with references where possible, the book falls short of being a concise and stimulating discussion. Few, if any, new ideas appear and attempts at integration of diverse opinions result in summaries based on one person's feelings.

On the credit side, one can say there are interesting and valuable bits of information scattered through the text. Some of the discussions are clear and concise. The informed reader may find the book of value, and workers in the fields touching on the subject of cell division may find it stimulating. However, for all its shortcomings, an integrated series of discussions by individual investigators gives a better and more stimulating coverage than the method used in developing this volume.

J. HERBERT TAYLOR
Columbia University
New York, New York

LETTERS TO THE EDITOR

This is just to let you know that I think our visit to The New York Botanical Garden will always remain one of the high spots of our New York trip—and certainly one of the pleasantest.

We enjoyed the Snuff Mill in its lovely setting on the Bronx River and the tour around the gardens. But why go on?

Will you please extend our thanks also to Bride McSweeney, Bob Russo and Mike Griffin for showing us through the "Prop" and Conservatory?

I read and enjoyed the literature on the Garden which you gave me, while I waited the hour and a half for my plane after Helen Gilmore's plane left for Cleveland.

MARGUERITE SMITH
Garden Editor
Indianapolis Times

Yesterday I bought two post cards at the Garden and paid ten cents for them. Later I found I had three, as two had stuck together; so I am sending five cents in stamps.

L.C.R.,
Chicago, Illinois

Publications of THE NEW YORK BOTANICAL GARDEN

Books, Booklets, and Special Numbers of the Journal

The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada by H. A. Gleason and collaborators. Over 4,660 species described; each species illustrated; keys to families, genera, species; a complete glossary. 3 vols., $30.00, plus 75¢ handling and postage on domestic orders; foreign orders, full postage.

Flora of the Prairies, and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. $6.

Plants of the Vicinity of New York, by H. A. Gleason. 284 pages, illustrated. A handbook especially compiled for the beginner. 1935. Second edition 1947. $2.

The Bahama Flora, by Nathaniel Lord Britton and Charles Frederick Millspaugh. 695 pages. Descriptions of the spermatophytes, pteridophytes, bryophytes, and thallophytes of the Bahamas, with keys, notes on explorations and collections, bibliography, and index. 1920. $6.25.

North American Cariceae, by Kenneth K. Mackenzie, containing 539 plates of *Carex* and related plants by Harry C. Creutzburg, with a description of each species. Indexed. 1940. Two volumes, 10¾ x 13½ inches; bound $17.50. Foreign postage extra.

Keys to the North American Species of Carex, by K. K. Mackenzie. From Vol. 18, Part 1, of *North American Flora.* $1.25.

Montgomery Conifer Collection, by Dorothy Ebel Hansell and collaborators. Non-technical descriptions of the conifers comprising the Montgomery Collection in the garden, with information on habitat, history and usage. Illustrated. First edition 1957. 50 cents.

Plants of the Holy Scriptures, by Eleanor King, with a check-list of plants that are mentioned in the Bible, each one accompanied by a quotation. Revised from the Journal of March 1941. 23 pages, illustrated. 1948. 25 cents.

Food and Drug Plants of the North American Indian. Two illustrated articles by Marian A. & G. L. Wittrock in the Journal for March 1942. 25 cents.

Vegetables and Fruits for the Home Garden. Four authoritative articles reprinted from the Journal, 21 pages, illustrated. Edited by Carol H. Woodward. 1941. 25 cents.

The Flora of the Unicorn Tapestries, by E. J. Alexander and Carol H. Woodward. 28 pages, illustrated with photographs and drawings; bound with paper. 1941. Second Edition 1947. Third Edition 1950. 25 cents.

Catalog of Hardy Trees and Shrubs. A list of the woody plants being grown outdoors at The New York Botanical Garden in 1942, in 127 pages with notes, a map, and 20 illustrations. 75 cents.

Succulent Plants of New and Old World Deserts, by E. J. Alexander. 64 pages, indexed. 350 species treated, 100 illustrated. Bound in paper. 1942. Second edition 1944. Third edition 1950. 50 cents.

Review of Juniperus chinensis, et al., by P. J. van Melle. A study of the many varieties and forms of *Juniperus* which have been commonly included in the concept of *J. chinensis.* 108 pages, illustrated, bound in paper. 1947. $2.00.

Ferns and Their Culture, a group of articles and illustrations from the Journal, March, April, May 1940; 32 pages, illustrated. 25 cents.

Periodicals

The Garden Journal of The New York Botanical Garden, bimonthly, designed to stimulate interest in the world of plants and the science of plant life, contains non-technical articles on botanical, horticultural and kindred subjects; also special departments — book reviews, questions and answers, news and comments. $3.00 a year. 35¢ single copy, 45¢ back numbers. Foreign subscription $3.50 a year.

Addisonia, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants, 8 plates in each number, 32 in each volume. Published irregularly. Subscription price $10.00 a volume; not offered in exchange. Free to members of the Garden. Volume 23, No. 1 published November 5, 1954; Volume 23, No. 2, published November 6, 1955. Volume 23, No. 3, in preparation.

Journal of The New York Botanical Garden. Volumes 1-50. Former monthly publication continued as The Garden Journal. Price 25¢ per copy.

Memoirs of The New York Botanical Garden. A collection of scientific papers by members of the staff and collaborators; issued irregularly. Vols. 1-6, to members of the Garden, $1.50 a volume; to others, $3.00. Vol. 7, to members, $2.50; to others, $5.00. Vols. 8, 9, $10.00.

Contributions from The New York Botanical Garden. A series of technical papers reprinted from journals other than the above, 1899-1933. 25 cents each, $5 a volume. List of separate titles on request.

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. 100 parts now issued. Now in a second series. Not offered in exchange. Prices of the separate parts on request.

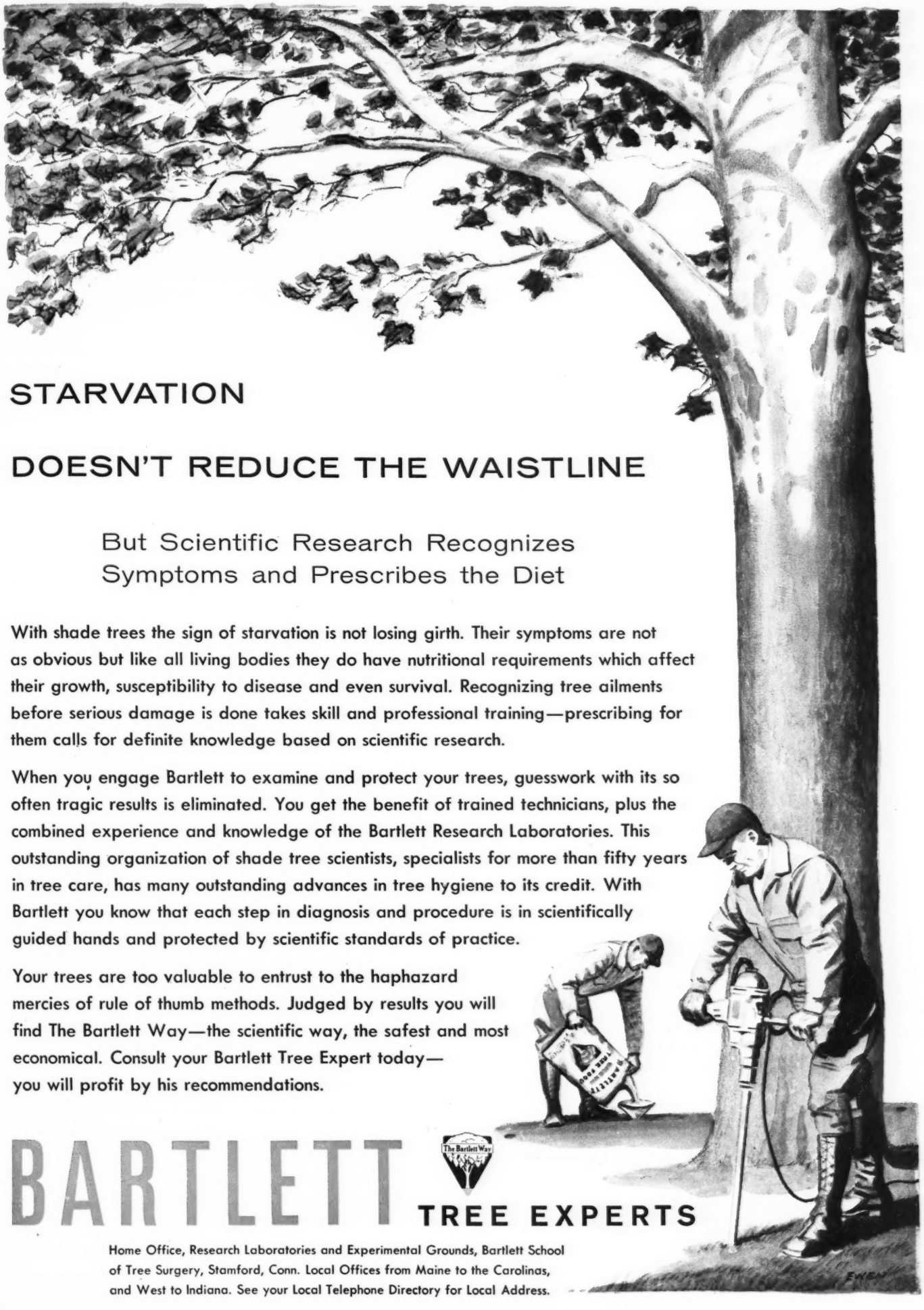
Brittonia. A quarterly journal devoted to taxonomy, published for The American Society of Plant Taxonomists. A subscription is included in the individual dues paid by members of the Society; cost to others, $7.50 per volume. Prices of back volumes on request. Now (1958) in its 10th volume.

Mycologia, bimonthly, illustrated in color and otherwise; devoted to fungi, including lichens, containing technical articles and news and notes of general interest. Official organ of the Mycological Society of America. Now (1958) in its 50th volume. Subscription $8.50 a year, single copy $1.75.

Economic Botany, a quarterly journal devoted to applied botany and plant utilization. Now in its 12th volume. Subscription $6.00 a year, single copy $1.50.

All orders and inquiries should be addressed to

THE NEW YORK BOTANICAL GARDEN Bronx Park, New York 58, N. Y.



STARVATION

DOESN'T REDUCE THE WAISTLINE

But Scientific Research Recognizes Symptoms and Prescribes the Diet

With shade trees the sign of starvation is not losing girth. Their symptoms are not as obvious but like all living bodies they do have nutritional requirements which affect their growth, susceptibility to disease and even survival. Recognizing tree ailments before serious damage is done takes skill and professional training—prescribing for them calls for definite knowledge based on scientific research.

When you engage Bartlett to examine and protect your trees, guesswork with its so often tragic results is eliminated. You get the benefit of trained technicians, plus the combined experience and knowledge of the Bartlett Research Laboratories. This outstanding organization of shade tree scientists, specialists for more than fifty years in tree care, has many outstanding advances in tree hygiene to its credit. With Bartlett you know that each step in diagnosis and procedure is in scientifically guided hands and protected by scientific standards of practice.

Your trees are too valuable to entrust to the haphazard mercies of rule of thumb methods. Judged by results you will find The Bartlett Way—the scientific way, the safest and most economical. Consult your Bartlett Tree Expert today—you will profit by his recommendations.

BARTLETT TREE EXPERTS

Home Office, Research Laboratories and Experimental Grounds, Bartlett School of Tree Surgery, Stamford, Conn. Local Offices from Maine to the Carolinas, and West to Indiana. See your Local Telephone Directory for Local Address.

TRI-OGEN MAKES MY
prize winning roses possible

TRI-OGEN is the only quick, sure way to protect your roses and keep them free from blackspot, mildew, and insect pests. Easy to apply and economical too. It is all that is needed for complete rose protection.

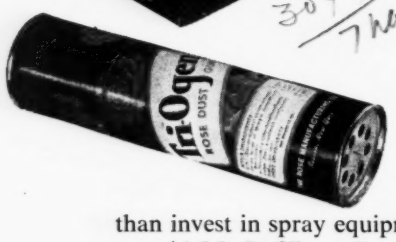
Time-tested and *proven* to be the most effective stimulant for bigger, brighter blooms, vigorous foliage and longer producing bushes, TRI-OGEN is recommended by leading rosarians everywhere.

TESTED
Tri-Ogen

For Complete ROSE PROTECTION

Available in 3 handy forms . . . spray, dust or bombs.

Tri-ogen 3-Way Rose Spray. The most thorough, economical and complete rose spray available. Recommended for general garden use. Three-way protection. 1. Kills insects, 2. Stops fungus disease, 3. Feeds plants. Season kits $2.25 up.



Tri-ogen 3-Way Rose Dust. Powerful insecticide-fungicide combination for those who prefer to dust rather than invest in spray equipment. Extra large refillable duster gun $1.25. Refills, 1 lb. $1.50, 5 lbs. $6.00.

Tri-ogen 3-Way Rose Food. A scientifically-balanced, rose growing blend. Contains Hormones, Vitamin B_1 and vital trace elements. Quick tonic effect and lasting benefits assures more active root systems, sturdier growth and more dependable blooms. Works wonders on flowers, vegetables, lawns. 5-lbs. only $1.25, 10 lbs. $2.25.

Tri-ogen Rose and Flower Garden Bomb. Famous Tri-ogen spray at finger tip control for complete work saving protection. Large 12 oz. bomb only $1.50.

Write today for our free booklet, "How to Grow Big Beautiful Roses."
NOTT MANUFACTURING CO., INC., Box 832, Poughkeepsie, N. Y.